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AMERICAN POTASH INSTITUTE, INC.
INVESTMENT BUILDING **WASHINGTON, D. C.**

Better Crops with PLANT FOOD

The Whole Truth—Not Selected Truth

R. H. STINCHFIELD, *Editor*

Editorial Office: Investment Bldg., Washington, D. C.

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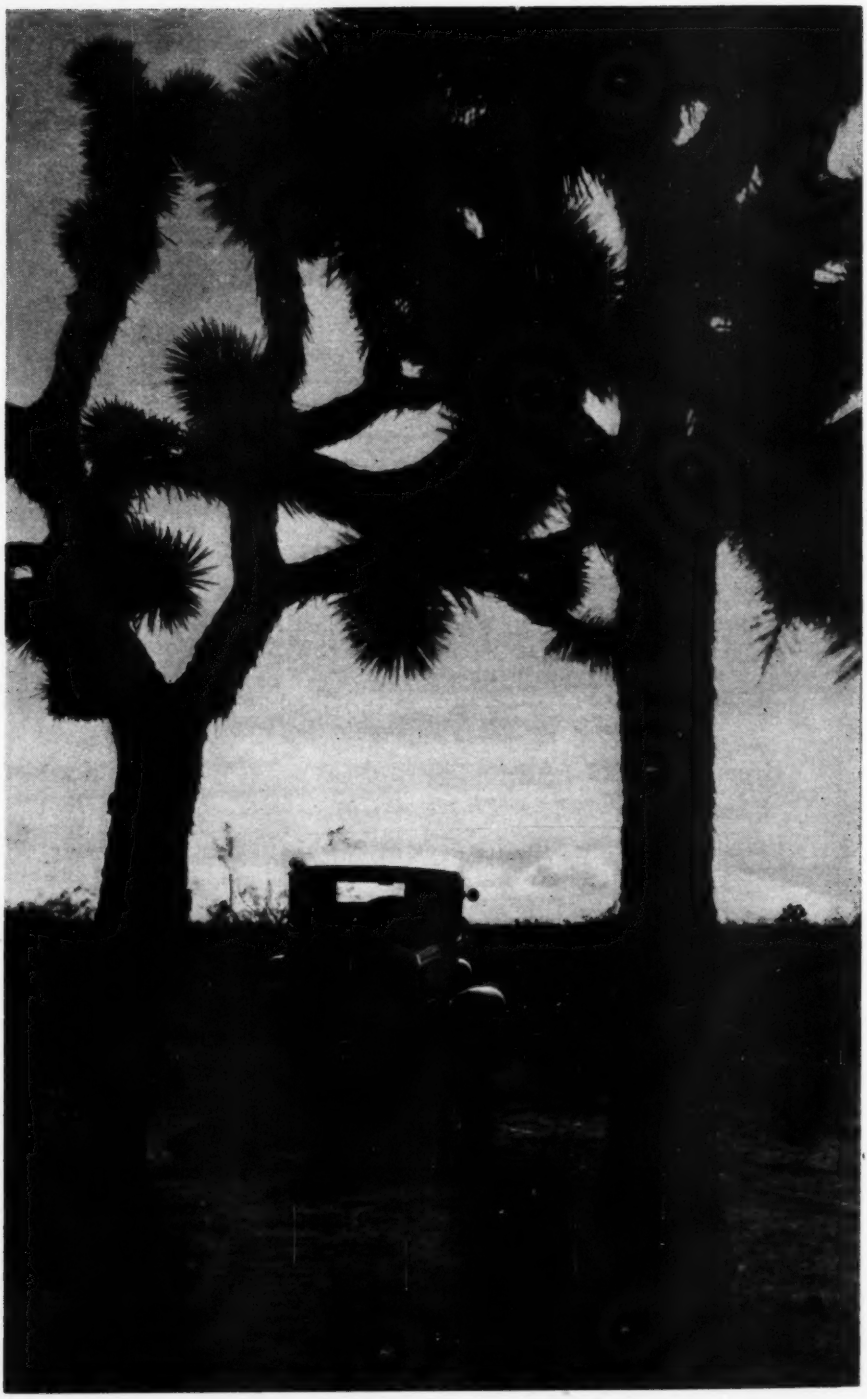

WHERE WINTER'S TRAIL ENDS.

Better Crops with PLANT FOOD

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VOL. XXII WASHINGTON, D. C., FEBRUARY 1938 No. 2

Jeff makes the query

Is Individualism Out?

Jeff McDermid

PONDERING sundry farm experiences both before and after the AAA, your favorite scribe has stumbled on the notion that two rather primal forces direct the destiny of agriculture—weather and individualism. That is, you can pretty safely wager that nobody can manage a farm (outside the pages of a bulletin) without finding weather and individualism the biggest factors to be thankful for or to wrestle with.

Despite the fact that we have a bigwig bureau all set to handle the weather at Washington, with scores of its branches blown about the country, no carping critic of Federal domination can make a pretense that we have the slightest bureaucratic control of the weather. Since the days when Adam grafted apples, farmers have admitted that not much can be done about it.

Whereas with the second factor, individualism, we imagine we can set up a school or a jail, or something, to adjust its effect on our lives and fortunes. But in this case some current opinions of great lung power insist that modern society, with bureaucrats and government meddling, have spoiled the once heroic chances of individualism to leave its mark on farm progress. They try to comfort us on this reputed loss of our native rural individualism. They pat us on the bowed shoulders and remind us that in compensation for the loss of our esteemed personality at the

plow, we have largely been saved from such miserable remnants of the rugged era as the kerosene lamp, the frozen pump, the highway poll tax, and the remote fresh-air privy in zero weather. (They do this perhaps to hide the fact that we have exchanged a cold seat for a hot one.) "Tenneyrate," they proclaim that individualism has gone west with the last settlers and jumped in the ocean. Moreover, they say that individualism stands for selfishness and is therefore harmful, and that collectivism is the true answer!

Taking it up here just between us furrow folks, they're plumb loco! We can't escape the effects either of weather or individualism, and as we admit that little can be done to reform the former, maybe we can profitably think a little about the latter. And we can do a whale of a lot to strengthen our native individualism along the right lines and still not get in bad with the chaps who circulate membership papers for the co-ops.

ABOUT two decades ago a Wisconsin historian, Dr. Frederick Turner earned a reputation as the foremost student of the American frontier. Along with his studies he outlined a theory that the onward march of empire-making farmers with their self-reliance, sacrifice, and hardihood, set a standard and left an indelible impression on the country as a whole, and more especially on the traditions of agriculture.

Now everybody knows that these old-timers were not all high-minded fellows, and that their sweep across the continent left a few scars and sad spots as well as tributes, wreaths, and monuments. Yet his main contention was that the sturdy, positive character of these newcomers put something lasting and valuable into the character and ideals of their descendants. His impression was, that although the physical frontier had gone with the bison and the Indian, American agriculture had inherited a certain stamina and integrity which would surely be of help in meeting the social and economic frontiers still facing us.

We all know that Turner did not live to see the full effect of machine-age power and large organizations, or the magic of quick transportation and instant communication, on the daily outlook of the farmer—who in Turner's day was of course the last of the rugged individualists.

SO WE may take up his question ourselves and ask if in this day of new alignments his theory still has any roots left in our country soil? We can ask ourselves if the farmers of the country can rely on the fibers of sound individualism woven into the rope of cooperation to solve the complexities which are as hard to conquer as the wilderness. Secretary Wallace himself has faith in its latent power today, but he says that our future explorations must lie in the realms of the heart and the mind—and if this be true, then where is there a force stronger than trained individualism to depend upon?

But if we meet such a challenge, our first job is to sort over our assortment of individualism and pack along with us only the kind we can use. We throw overboard the weak and subservient kind, the shallow and selfish kind, the ignorant and prejudiced individualism—happily now in the minority. Many cases of this nature still bob up around us, but the sins of the minority of selfish individualistic farmers and leaders should not be laid at the door of agriculture in general.

Two other things we do not propose to do. We do not intend to set up our individualism against society, or claim that the ancient dogma of John Stuart Mill anent government encroachment is a threat. Farmers as individuals owe a constant debt to society and their community for good roads, better schools and churches, and adjacent markets to create stable land values.

Again we reject the philosophy of

Mill and others, who held that all things secured for individual liberty are taken away from government, and that every gain for government power is a consequent loss to individualism. Thus far, at least, in my bucolic wanderings and discussions, I have found few farmers proclaiming their chief goal to be utter freedom from State or Federal influence, or that the utmost end of liberty is to be "let alone."

But if we are looking for a place where individualism is really being invaded and broken down, it lies in the invasion of the individual's natural right and duty to *think for himself*. Large and well-organized pressure groups and mass formations try to take over the thinking business for the individual. They are willing to do it for him by proxy and at a price! As much pressure is brought to bear in trying to get the individual farmer to abdicate his mind as was lately focused on the Duke of Windsor for the same purpose.

Much blatherskite is showered around to make us think that individualism is old-fashioned, conservative, and anti-social, and to uphold these loud mass vociferations as the true guardians of democracy, progress, and rural hope! Yet a peek behind the scenes of farm history shows many things to the contrary.

By the kind of agricultural individualism needed today I mean the constructive kind, that takes thought before decisive action, and which weighs all mass propaganda before it allows itself to be swept like a chip on the wave of mob hysteria. Every trained, thoughtful, hopeful, serious-minded, and socially helpful farmer is just such an individual. Over against him are arrayed many loose-thinking blocs and pressure parties, sometimes claiming all sorts of bona fide farm membership or sectional allegiance, and advocating hand-made programs to be bossed by hand-picked men. Even the best of farm organization leaders have sometimes fallen for these artificial stunts, and they are the bane of existence for the government official.

OUR better individuals in farming are students, men with patience acquired in practice, usually tolerant, who know that Rome wasn't built in a day and that dollars don't grow on bushes. On the contrary the characteristics of mass formations and pressure movements consist of advertising sudden salvation via the short route, to grab the main chance and push for the quick conquest. Intolerance and prejudice also become the spears they use to drive the individual along in their processions.

Instances of individuals yielding to flamboyant and half-baked schemes of this kind are so numerous that it seems almost worthless to mention any. They rank all the way from actually harmful things down to mere examples of lazy mentality.

Just one of these mass-mind floods comes to mind, as experienced in dairyland. Rather than face the issue

(*Turn to page* 46)

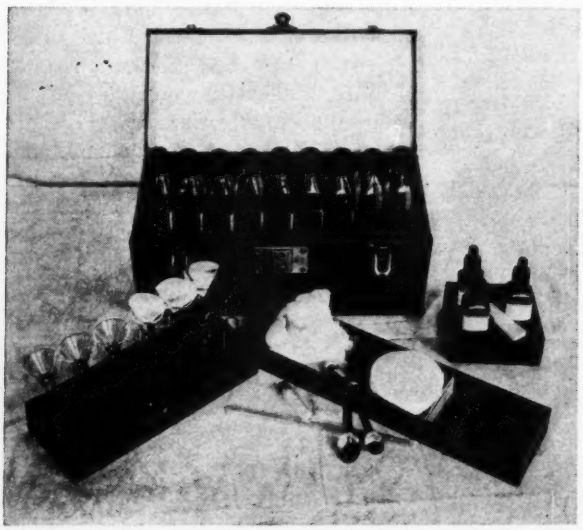
Rapid Chemical Tests Show Soil Needs

By S. F. Thornton

Soil Chemist, Purdue University Agricultural Experiment Station, Lafayette, Indiana

IT has long been recognized that the majority of Indiana soils are phosphorus deficient and in need of additional lime. Recognition of the general prevalence of potash deficiency has come only in recent years. However, recent yield data from the permanent fertility experimental plats and numerous fertilizer demonstrations, as well as observations as to the general prevalence of potash-deficiency symptoms on growing crops and the results of soil tests, are indicating that potash deficiency is rapidly becoming as serious a problem as is phosphate deficiency.

This is particularly true for the corn crop and is due in large measure to the fact that in the past phosphorus has been predominant in the fertilizers used. This practice has resulted in the rapid depletion of the "available" potash supplies in the soil through crop removals without providing for adequate replacements. Due to the recognition of this condition, the present trend in fertilizer analysis appears to be toward equal parts of phosphorus and potash as is illustrated by the fact that the average potash content of all fertilizers sold in Indiana has increased from 1.5 per cent in 1920 to 7.8 per cent in 1936 while the average phosphorus content has remained almost constant over this 16-year period.



A Purdue Kit containing all reagents and equipment necessary for both soil and plant tests.

The use of rapid chemical tests as aids in determining fertilizer needs was started in Indiana by the work of Hoffer (1). Hoffer established the inverse relation between the accumulation of iron in the nodal tissues of the corn plant and the supply of potash available to the plant and developed chemical field tests for use in diagnosing nitrogen and potash deficiencies. When used in conjunction with external symptoms, these tests proved to be quite

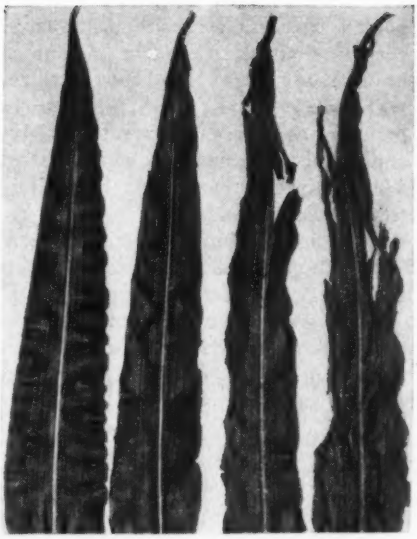
helpful and reliable, indicated the great possibilities of such methods of attack, and emphasized the need for additional tests.

In 1932 the author (2) proposed a simple and rapid test on plant material for use in diagnosing phosphorus deficiencies and in 1933, a similar test for potash (3). These tests on plant material were adapted to use on soils in 1934 (4), making it possible to use practically identical reagents, equipment, and technique with both soils and plants. The tests on soils indicate the dilute acid-soluble phosphorus and the water-soluble and replaceable potash supplies. The tests on plant material indicate the relative nitrate nitrogen, phosphate phosphorus, and total potash contents. With soils they indicate the "available" supplies present in the soil and with plants, the relative nutrient levels in relation to other possible limiting factors.

Used Extensively

Preparation of the Purdue Soil and Plant Test Kit, containing all reagents and equipment necessary for both soil and plant tests, was begun in 1934 by the Agronomy Department of the Agricultural Experiment Station. Since that time more than 700 kits have been supplied, at approximate cost, to extension workers, vocational agriculture instructors, canner's fieldmen, C. C. C. agronomists, soil conservation workers, fertilizer salesmen, greenhouse operators, and, in a few cases, individual farmers. Additional supplies of reagents and equipment are furnished to kit owners as needed.

The wide distribution that the Purdue kit has received has naturally led to the very extensive use of the tests in Indiana. It is estimated that in the neighborhood of 100,000 soils samples are tested each year, at the present time. Several thousand samples are tested each year in the Soils Laboratory of the Agronomy Department



When corn is suffering from potash deficiency the leaves fire along the edges.

but the greater part of the testing work is carried on by county agents and vocational agriculture instructors. Practically all county agents and the majority of vocational agriculture instructors have kits and operate a testing service. It is required that such workers receive training in the use of the tests before they are permitted to purchase a kit. Through extension workers an attempt is made also to help the various workers in the State in the proper interpretation of the test results.

The procedure used in the Purdue tests has been kept simple with a view to making their use possible by workers not specially trained in soils or chemistry. Proper interpretation of the test results in terms of fertilizer needs is the more difficult part of the problem and requires considerable experience. The county agent, because of his familiarity with local soils, crops, and fertilizer practices, should be especially well qualified to make such interpretations. It should not be expected that test results can serve as the sole basis for fertilizer recommendation. Neither should it be ex-

pected that such results can answer the questions as to exactly how much or precisely what kind of fertilizer will give the most profitable returns for any one year. Test results do give additional information which is of very great help in making better fertilizer recommendations. These results indicate trends in fertilizer needs and changes that may profitably be made in present fertilizer practices.

As a general guide in making fertilizer recommendations for soils that have been tested, a printed sheet containing suggestions for the more important crops grown in Indiana has been supplied to all workers using the tests. The suggestions contained in this sheet are shown in Table 1.

It will be noted that by combining "low" and "very low" and "high" and "very high" readings the tests for phosphorus and potash have been divided into three groups for each or nine possible combinations for the two nutrients. The analyses and quantities of fertilizers recommended for these nine groups are based on general experience as to the responses that may be expected for the various crops and the "available" phosphorus and potassium supplies indicated by the test readings. The ratio of the plant nutrients, especially phosphorus and potash, to each other is the important thing in the fertilizer analysis. In preparing this list of suggested fertilizer recommendations an attempt has been made to use only such analyses as are on the "approved" list prepared by the fertilizer manufacturers in consultation

(*Turn to page* 42)

TABLE 1.—SUGGESTED FERTILIZER RECOMMENDATIONS FOR INDIANA [1]

Soil Tests [2]		Corn, Soybeans, Oats [3]			Wheat, Rye, Barley	
			Lbs. per acre			
Phosphorus	Potassium	Analysis	In hill for corn	Drilled in row for corn	Analysis	Lbs. per acre
VL or L	VL or L	0–12–12	100	200	2–12–6	300
VL or L	M	0–14–7 or 0–14–6	100	200	2–12–6	300
VL or L	H or VH	0–20–0	100	200	2–14–4 or 0–20–0	250
M	VL or L	0–10–20	75	150	2–12–6	250
M	M	0–12–12	100	150	2–12–6	250
M	H or VH	0–20–0	100	150	2–14–4 or 0–20–0	200
H or VH	VL or L	0–8–24	75	125	3–12–12	150
H or VH	M	0–10–20	75	125	2–12–6	150
H or VH	H or VH					

Soil Tests		Truck Crops			Alfalfa (At seeding time)	
			Lbs. per acre			
Phosphorus	Potassium	Analysis	Muck [4] soils	Other soils	Analysis	Lbs. per acre
VL or L	VL or L	3–12–12	750	500	0–12–12	300
VL or L	M	2–12–6 or 4–10–6	750	500	0–14–7 or 0–14–6	300
VL or L	H or VH	2–14–4	750	500	0–20–0	250
M	VL or L	3–9–18 or 2–8–16	600	400	0–10–20	250
M	M	3–12–12	600	400	0–12–12	250
M	H or VH	2–12–6 or 4–10–6	600	400	0–14–7 or 0–14–6	200
H or VH	VL or L	3–9–18 or 2–8–16	450	300	0–8–24	200
H or VH	M	3–12–12	450	300	0–10–20	200
H or VH	H or VH	2–12–6 or 4–10–6	450	300		

[1] These suggestions are for average conditions. Both analysis and amount should be varied to suit particular conditions. If the recommended analysis cannot be obtained readily, any similar analysis may be used. When using double strength fertilizer, reduce the amount per acre. On manured land, the analysis containing the next lower potash ratio is recommended. On mucks and black sands, the analysis containing the next higher potash ratio is recommended for the general farm crops.

[2] VL=Very Low; L=Low; M=Medium; H=High; VH=Very High.

[3] Oats and soybeans are seldom fertilized but same amounts as in hill for corn may be used.

[4] For late potatoes and other late planted crops, fertilizers without nitrogen but containing the next higher potash ratio are usually recommended.

Rotations & Fertilizers For Bright Tobacco

By C. B. Williams
Agronomist, North Carolina State College of Agriculture, Raleigh, North Carolina

ALTHOUGH in this article attention will be devoted to a discussion of proper crop rotation and fertilization for tobacco in the bright belt of the Coastal Plain area of the South, it must be realized by growers that there are other factors which must be carefully looked after in the growth of tobacco if best results are to be obtained. If proper cultural methods and the best kinds of seed are not used, and the soil type is not carefully selected with reference to its special suitability for the production of fairly high yields of high quality tobacco, it matters not how well suited the rotations are or how wise the fertilization is, best results cannot possibly be obtained. Repeating, all of these factors must be carefully provided on every farm if the highest yields of the best quality tobacco are to be secured and the greatest average net returns afforded the producers. If any one of them is neglected, it may become the limiting factor and the yield or quality of the crop, or both, will suffer materially and the returns of the producer will be diminished.

Tobacco like this was the result of well-balanced fertilization.

Tobacco is a most exacting crop in all of its requirements. Its growth directly after legumes usually does not result in the production of the highest quality of leaf, particularly if the legumes are of a heavy growth and the crop at or just before maturity is plowed into the soil. This does not mean that legumes cannot be grown in rotation with tobacco, but it does mean that when they are included and are turned under after growth, this should usually be done before another crop in the rotation at least 1 year prior to putting the land into tobacco. Of course if the growth of the legumes is light, their being turned under just before the tobacco is grown on the average soil would probably not injure the quality of the tobacco and might help on the poorer soils. Notwithstanding this fact, it is not generally considered a good practice to follow the tobacco immediately after legumes because of the danger of injuring the quality of the leaf.

Suitable Rotations

In giving four rotations below that are suitable for use in this area, we are advertent to the fact that there are others which can and are no doubt being used at the present time with excellent results. If such be the case, by all means continue to use them. The rotations given are submitted as types of good ones in the hope they will be of some value to tobacco growers. They are simple and if put into effect should not only give good results in increased yields and in the improvement of the quality of the tobacco crop, but will help in maintaining the yields of other crops in the rotations to a fairly high level. In some cases they will no doubt help to reduce the loss from disease and insect attacks. The rotations suggested for wider use by tobacco growers in this area are:

For Sandy Loam Soils:

(1) 1st year—Tobacco, abruzzi rye, vetch or crimson clover in fall (for turning under).
2nd year—Corn (for grain) with velvet beans (for grazing and turning under).
3rd year—Cotton, abruzzi rye in fall (turned under the following spring).

(2) 1st year—Tobacco, crimson clover in fall for turning under.
2nd year—Corn, abruzzi rye in fall (turned under the following spring).

(3) 1st year—Tobacco with cowpeas sown at last cultivation (for turning under).
2nd year—Cotton, abruzzi rye in fall (for turning under).

For Very Sandy Soils:

(1) 1st year—Tobacco, abruzzi rye and vetch or crimson clover in the fall (for turning under).
2nd year—Sweet potatoes, abruzzi rye in fall (for turning under).
3rd year—Wild grass and weeds.

As most growers well know it is of the highest importance to use for bright tobacco the kind of fertilizer in proper amounts to best fit the needs of tobacco grown on each particular soil type. Unfortunately in some cases, this is not done, particularly by many who may have used in the past and are planning to use this year, the ordinary 3-8-3 mixtures. The best yields of high quality tobacco are seldom, if ever, obtained from the use of such mixtures. These are not usually properly balanced for tobacco. They have too little potash and frequently contain too much chlorine and not enough magnesia, especially for use on very sandy soils and others on which tobacco is grown and is quite frequently subject to magnesia deficiency (sand-drown).

For several years, interested official agricultural workers of the whole bright tobacco belt of the South, including tobacco workers of the U. S. Department of Agriculture, have been

(*Turn to page* 38)

Jennets and foals on good pasture are easy to keep.

Green Pastures

*By E. W. Sheets**

Chief, Animal Husbandry, State College, Mississippi

THERE is a time-honored belief that the good things in life come hardest; that the race is to the swift, the persistent, and brave. In the production of livestock, especially, it is regarded that profits and extra pains go hand-in-hand. If a man's farm bristles with good crops and green pastures, and if his cattle are slick and thrifty, his neighbor riding by is apt to shake his head and say that it took "a deal of hard work."

There is one crop and one system of farming that forms a notable exception to this rule. That crop is pasture: the system, the ultilization of it by livestock. The providing of abundant pasture and other forage crops throughout the year is one of the stockman's most important problems. Whether it be permanent, annual, or range pasture the answer is the same, depending somewhat upon the particular kind of livestock for which it is being provided.

We know that there is no feed which enables an animal to pick up flesh so rapidly as good pasture. We also know that formerly on most farms in many sections of the country the land usually allotted to pasture was that which was not much good for any other crop use; that little or no attempt was made to put fertilizer back on the land to make up for the

* EDITOR'S NOTE: Dr. Sheets was for more than a dozen years Chief of Animal Husbandry in the U. S. Department of Agriculture. Among his contributions during this time was important pasture research and progress.

fertilizing substances taken off each year in the form of milk or meat or bones or hide or horsepower.

We know, in short, that we spend very little money on our pastures, almost no labor on them, that we wish we had them with us the year round, that they're undoubtedly the cheapest feed, for, although grass is not marketable directly for money, studies and general observation in many sections seem to indicate that those livestock farmers who have a great deal of their land in pasture make more money than those with but a little pasture.

Early spring finds these Hereford calves on annual pasture.

Investigate Further

What we need to know more about, with respect to pastures, is, chiefly: What proportion of a general farm where livestock is kept should be in good pasture, and how much of each pound of milk, beef, pork, mutton, wool, and each unit of horsepower should be grown from grass and other forage crops, to make the farmer the most money? The answer will vary with the farm, the locality, and the relative cost of other things. One of the certain advantages of our present agricultural situation is that grass is being given its best opportunity to show what it can do. Another is that many new converts have, through necessity, been made for pastures that formerly would not give them passing consideration.

When we speak of the use of livestock in utilizing non-crop land we realize there are some who believe all that is necessary is to turn animals on it and let them graze at will. It is not so simple as that. To utilize such areas with livestock so that taxes and interest above living and operating expenses may also be obtained is a complicated problem.

We have often said that if told why a tract of land had been abandoned, we could tell whether livestock had an opportunity to bring it into practical use in a farm program. There are two words, each beginning with the sixth letter of the alphabet, which are the keys to this question. They are *feed* and *forage*. We just as well jump over to the next letter of the alphabet, and we have *grass* as the master key to the whole situation

which is the subject of our discussion. Because, if a stretch of country won't grow grass (and legumes that logically belong with it), it won't grow much in the way of livestock nourishment. Without grass we have a slim chance of success in the production of livestock on a profitable basis.

A Cheap Feed

Many readers are familiar with our farm philosophy which holds that the best security for stockmen is an abundance of good pasture and roughage at all times. Just as haystacks and bulging granaries offer the greatest security for a permanently sound livestock enterprise, so does an abundance of good pasture at all seasons insure the most efficient and economical system of livestock maintenance and production. In other words, grass is the stockman's cheapest feed. It costs less to produce than cultivated crops. It also costs less to harvest, as the animals do most of the work themselves. Whether pasture is scanty or abundant, however, it has been learned by wise stockmen that careful management is an important item, even when grass, the most economical feed of all, is concerned. The farmer with good pastures has a decided advantage over another who must rely upon higher priced feeds for a larger share of his grains, but grass alone seldom makes top livestock. And the best pastures may make greater profits if the stockman wisely provides the proper balance with other forage and grain crops.

Generally the first thing to determine is whether the additional pasture is to be permanent or annual. Annual pastures afford greater insurance against parasites, fit into rotations readily, and distribute the benefits of grazing animals more uniformly on the whole farm. On the other hand, such pastures require much more labor and seed than permanent pastures, are not so effective in controlling erosion, and are somewhat less dependable than permanent pasture, since in many areas one has annually the risk of not getting a good stand. Generally it is advisable to have both permanent and annual pastures, with the permanent pasture furnishing the bulk of the grazing and the annual pasture being of such size, kind, and time of seeding that it furnishes an abundance of grazing while the permanent pasture is dormant.

In the North, cereals and Italian rye grass supplement permanent pastures in the fall and spring, while sudan, alfalfa, and soybeans do the same in midsummer. In the South, vetch, crimson clover, and other legumes as well as Italian rye and cereals lengthen the grazing season in the spring and fall. Such pastures are not commonly dormant in midwinter. For permanent pasture, the land most subject to erosion should be selected. Such land is most likely to have an available water supply for the livestock. While such land may not always be located conveniently to the farmstead, it is better as a rule to build a lane for the stock to go back and forth to the pasture than it is to crop the rougher land while more level land nearer the farmstead is in pasture. If such lanes are made 4 to 6 rods wide, among other advantages they are much less likely to be barren, weedy, gullied, and unsightly than if barely wide enough for passage. A lane 4 rods wide and a quarter of a mile long requires only 2 acres and may furnish considerable grazing.

There are many advantages of taking certain fields out of cultivation and seeding them to pasture. It will not only stop most of the erosion and gullying which may have been taking place but at the same time be an important step in soil improvement. If rolling land which has a porous subsoil is level-terraced, practically all of the water which falls can be held until it soaks in.

On farms which have several fields

(*Turn to page* 39)

Fertilizer Developments In Mississippi

By E. B. Ferris

Superintendent, Holly Springs Branch Experiment Station, Holly Springs, Mississippi

THE writer has had many years experience in dealing with fertilizers in Mississippi. Starting in 1893 as a student assistant to the State Chemist, he has since witnessed the many changes in the fertilizer business of the State, always as one vitally interested in all changes as they occurred, because all the while engaged in some phase of agricultural work closely connected with the ups and downs of the fertilizer industry.

During these many years we have seen the fertilizer business grow from the exercise of no control by the State over the composition of materials and mixtures sold, and where an unscrupulous dealer might sell any material he chose to call a fertilizer at any price the farmer would pay, to the present close inspection by State authorities of every fertilizer mixture or material put upon the market. Starting as a graduate chemist about the time the first fertilizer law was put into effect, we have seen the tonnage used in the State gradually rise from about 17,000 tons in 1895 to more than 400,000 tons in 1930, fall off severely during the years of the depression, and again rise to reach some 330,000 tons in 1937. This recent increase in fertilizer usage and better selection of land and varieties, together with almost ideal weather conditions, are responsible for the highest yield of cotton per acre in 1937 that Mississippi has ever grown.

These comparative tonnages do not show the real picture of actual plant-food increases in the State, for in 1895 many of the best sellers contained only from 8¼ to 9½ pounds of plant food per hundred pounds. In recent years the law forbids the sale of any mixture containing less than 16 units, and some of the present sellers contain 24 units, with a few as high as 60 units. It is possibly safe to say that the average complete fertilizer sold today contains at least twice as much actual plant food per ton as did the average of 40 years ago, or that Mississippi used in 1937 almost 40 times as much commercial plant food as she did in 1895.

Extent of Need

In the early days, it was our duty as a chemist not only to analyze the samples as they came to the laboratory, but also to go out over the State during the selling season and collect samples of the various shipments as they were received by the dealers from the factories. Thus we came to know rather intimately those parts of the State where fertilizers were used in any quantity. In those days an inspector spent the most of his time in south Mississippi, a much smaller part of it in the sandier parts of east Mississippi, scarcely no time at all in the loamy lands of north and west Mississippi, and never a day in the Mississippi Delta.

As the years have passed, the use of fertilizers has extended to every part of the State. Even the Mississippi Delta, famed the world over for

the richness of its soils, has come to use about as much nitrogen per acre as the poorest lands in the hills, and the loamy lands of north and west Mississippi depend on fertilizers about as did south Mississippi 40 years before. Another change almost as revolutionary as that of increased tonnage, higher analysis, or the extension of fertilizer territory, has been the ratio at which nitrogen, phosphoric acid, and potash are being used in fertilizer mixtures. In 1895 the prevailing ratio was a 1-5-1, or wider, whereas now this ratio has been narrowed to a 1-2-1, or narrower, and the tendency seems toward a still narrower ratio of 1-1-1. Witness the 2-10-2 as the prevailing analysis of 1900, the 4-8-4 some 30 years later, and what the following figures may imply as to the relative importance of nitrogen, phosphoric acid, and potash.

The Mississippi experiment stations have had much to do with the change in composition of fertilizers sold in the State. Located as they have been on several of the main soil types, these stations have conducted thousands upon thousands of tests to determine not only the plant foods needed but as well their ratio to each other and the amount per acre most profitable to apply. The writer spent 26 years in doing such work in south Mississippi and during the past 6 months has succeeded a former co-worker who had likewise done the same kind of work in northwest Mississippi, but on a radically different soil type.

Demonstrations show that potash will control cotton rust (potash starvation). Left: Insufficient potash, badly damaged plant. Right: Sufficient potash, healthy, normal plant.

Thorough Tests

While south Mississippi used fertilizers from the beginning, northwest Mississippi used practically none before this station was established at Holly Springs and demonstrated their beneficial effects. It is most interesting to study the work of this Holly Springs Station with fertilizers, particularly the tests that were started many years ago and have been continued on exactly the same plots for 13 years in succession, giving them a sort of historic value. These tests afford a better idea of the long-time requirements of such soils, much better than if the same work had been done for even a longer time but on different plots.

We give here the increases in yields of seed cotton per acre that have been obtained as an average of 12 years' results, beginning in 1925 and including 1937, excepting only 1932 when yields were not included. These annual yields were obtained from an average of three plots each year, treated in the same way and compared with nearby plots that received no fertilizer. Six hundred pounds per acre of the several mixtures were used, the soil being in a well-drained bottom, later classified as Lintonia Silt Loam. These results are reported in Information Sheet No. 135 just issued

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Using Soil Tests To Get the Picture

By T. H. Blow
County Agent, Caledonia County, Vermont

THE use of soil tests as a guide to making fertilizer recommendations for the various fields, crops, and rotations of the Caledonia County, Vt., farms would seem to provide a fairly accurate measure for this work. These tests combining not only results on nitrogen, phosphorus, and potash, but also lime and calcium give a much-needed basis for a more effective field work by extension agents and a much more effective program under soil conservation work.

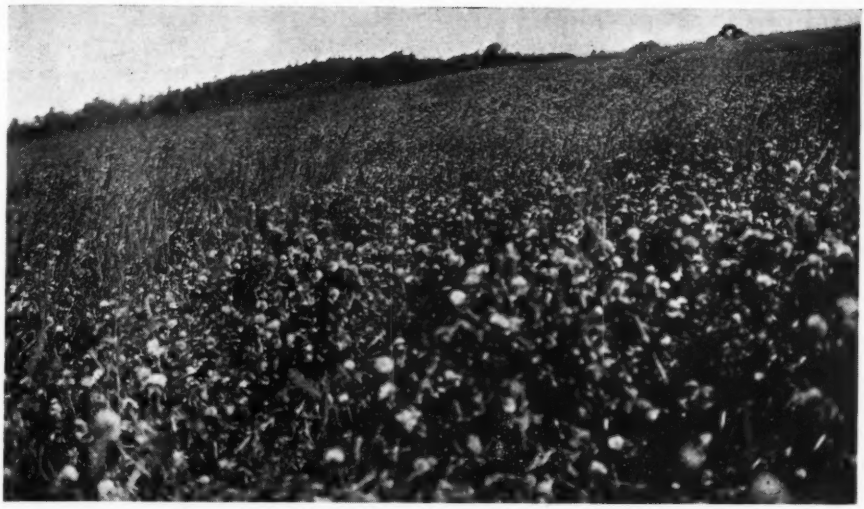
In 1937 some 900 samples, representing farms in every one of the 17 towns in the county, indicate a close correlation to fertility needs, and recommendations made as a result of these tests indicate a definite degree of accuracy as shown by the crop results. The tests, even though quick, answer the desire of many farmers to find out how best to make their fertilizer expenditures from year to year and crop to crop. The range used by the State in making the county analysis on the tests was from extra high to very low, and samples were distributed over the entire year.

In the case of nitrogen, the tests showed a sharp increase in the number in the medium, low, and very low group on the tests made in the fall months or from September through December. The cause of this was due to the nitrogen supply being depleted by the growing crops using up their normal supply in their growing period, as well as some loss from leaching. In the spring tests, applications of manure also tended to increase the number of tests in the higher group. With phosphorus and potash this sharp reaction in the lower groups did not occur in the fall tests, and where spring applications of either had been made, there was a decided tendency for very few samples to fall into the very low classification.

Low in Potash

While there has been a very definite knowledge that Vermont soils are low in phosphorus, the samples tested indicate that potash is also a much-needed plant food in Caledonia County. Out of the 913 tests made, 492 fall into the low-potash grouping, while with phosphorus 377 fall into the low classification. The graph accompanying this article shows the very sharp reactions for potash in the samples tested. The care of the farm manure supply not receiving the attention it should and the very limited applications of potash in past years account for this condition.

In barnyard manure fully 80 per cent of the potash is in the urine, and with inadequate absorption a great loss occurs. Caledonia County is a dairy county, hence a great supply is available right on the farm with proper care, but undoubtedly will need supplementing through the use of commercial fertilizers. In looking over the tests, it was also interesting to note that those farmers reporting a good stand of clover, or that clover stayed well, had a higher test for

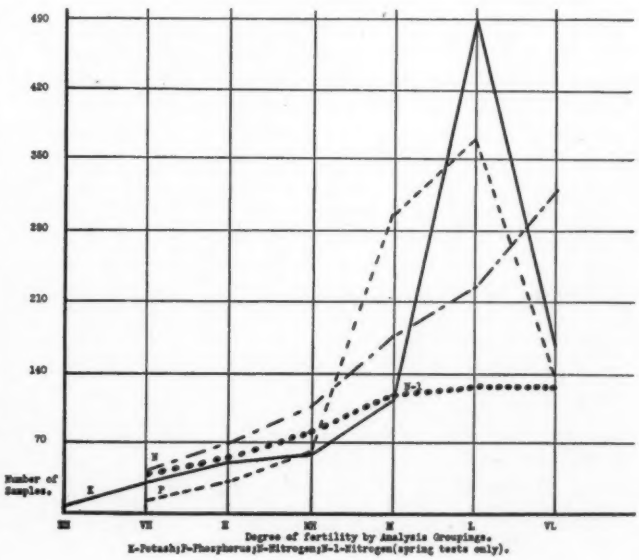


Hay crop on the Lee Farm, East St. Johnsbury, Vermont. This crop shows the effect of an even balance in fertility.

phosphorus and potash and particularly the latter. The county program calls for a concerted effort in using superphosphate, either in the gutter at the rate of at least 1 pound per mature cow per day during the stable season, or by adding it to the loads of manure as they are hauled to the fields at the rate of 30 to 40 pounds per ton.

This balances up the manure supply in so far as phosphoric acid is concerned and, if properly handled and sufficient bedding used to absorb the moisture, makes for a more efficient conservation of both potash and nitrogen. However, on many farms there is still a great loss of the potash which will have to be supplemented by individual applications or in high-potash complete fertilizers, if the greatest results are going to be obtained from our hay, pasture, and other forage crops.

The guide being used in Caledonia County for making fertilizer recommendations is the same as that used by the State and is, of course, adjusted to the soil history given by the farmer, such as slope, subsoil, drainage, pre-



vious treatment, and previous crops and cropping system. The tables used as a guide for recommendations are as follows:

showed much higher tests than those not following such a practice. This would also seem to be borne out by checking with farmers over various

POTASH FERTILIZATION TABLE

(Pounds of K_2O per acre to be supplied as fertilizer and used when seeding down or for top-dressing.)

Rating	Alfalfa		Clover & timothy		Permanent past. (top)		Perm. past.	Seed down
	Clay, silt loam	Sands, sandy loam	Clay, silt loam	Sands, sandy loam	Clay, silt loam	Sands, sandy loam	Clay, silt loam	Sands, sandy loam
Extra high	0	0	0	0	0	0	0	0
Very high	0	0	0	0	0	0	0	0
High	30	40	20	30	30	40	30	40
Medium high ...	40	50	30	40	40	50	40	50
Medium	50	75	40	50	50	75	50	75
Low	60	100	50	75	75	100	75	100
Very low	75	125	60	100	100	125	100	125

PHOSPHORUS FERTILIZATION TABLE

(Pounds of P_2O_5 per acre to be supplied as fertilizer and used when seeding down or for top-dressing.)

Rating	Alfalfa		Clover & timothy		Permanent past. (top)		Perm. past.	Seed down
	Clay, silt loam	Sands, sandy loam	Clay, silt loam	Sands, sandy loam	Clay, silt loam	Sands, sandy loam	Clay, silt loam	Sands, sandy loam
Extra high	0	0	0	0	0	0	0	0
Very high	0	0	0	0	0	0	0	0
High	40	48	0	0	64	64	0	0
Medium high ..	48	64	40	48	80	80	40	48
Medium	64	80	48	64	96	96	48	64
Low	80	96	64	80	112	112	64	80
Very low	96	112	80	96	128	128	80	96

NITROGEN FERTILIZATION TABLE

(Pounds of nitrogen per acre to be supplied as fertilizer.)

Rating	Alfalfa		Clover and timothy		Grass meadows (top)		Grass past. (top)		Perm. pasture (early grazing)	
	Clay, silt loam	Sands, sandy loam	Clay, silt loam	Sands, sandy loam	Clay, silt loam	Sands, sandy loam	Clay, silt loam	Sands, sandy loam	Clay, silt loam	Sands, sandy loam
Very high	0	0	0	0	0	0	0	0	0	0
High	0	0	0	0	0	0	0	0	0	0
Med. high	0	0	0	0	0	0	0	0	0	0
Medium	16	16	16	16	16	16	32	32	32	32
Low	32	32	32	32	32	32	48	48	48	48
Very low	48	48	48	48	48	48	56	56	56	56

There is very slight variation in tests between the towns in the county, a greater difference showing up between farms. Those farmers following a better system of manure conservation, cropping, and fertilization parts of the county who report this to be true in practice.

In summarizing these results it can be said that such tests can be put to a most practical use by the county

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J. W. Haddon Grows Popcorn for Profit

By F. J. Hurst
Editor, Agricultural Extension Service, State College, Mississippi

A NEW cash crop that is good enough to displace cotton on the farm of a successful cotton grower must be plenty good. But that is exactly what popcorn has done on the farm of J. W. Haddon, one of Newton county's best cotton farmers, who was once employed by the Government of Brazil as a cotton specialist.

Starting on a small scale five years ago, Mr. Haddon gradually increased his acreage in popcorn to 75 acres last year. However, over half of his crop last year was planted on poor land, and yields ranged from 6 bushels per acre on thin soil to 60 bushels per acre on the best land, with an average yield of 19 bushels per acre. Even at that popcorn paid him better than cotton, and he averaged close to a bale of cotton per acre.

This year he planted 250 acres, all of it good land, to popcorn. He grows Super Gold, a variety developed by Dr. A. M. Brunson of Kansas State College, who spent seven years developing three special characteristics of this variety. These important characters are (1) a high popping expansion, (2) elimination of the hard center in the kernel, common to all popcorn, and the development of more crispness, and (3) retention instead of dissipation of the popcorn flavor during the process of popping.

Mr. Haddon has done a remarkable work in further improving the popping qualities of Super Gold popcorn. When he started growing this variety four years ago, it had a popping expansion of 21.3 as compared with 15 for the United States average. Through the selection and testing of 1,500 to 2,000 individual ears each year, Mr. Haddon has increased the popping expansion to 29.9. This year he has a seed patch planted from ears that tested 42, the highest expansion on record. In fact, this was so high that he sent some ears to Dr. Brunson to verify his own tests. Dr. Brunson reported a slightly higher expansion than Mr. Haddon had obtained.

He prepares a good seedbed by thorough breaking and harrowing the soil. He plants popcorn in rows three feet wide and thins the plants to two stalks to the hill.

Proper Fertilization

He fertilizes heavily with a complete fertilizer high in potash. He adds 100 pounds of potash to a 6-12-6 fertilizer and applies 500 pounds of this mixture per acre before planting. Then 150 pounds of cal nitro per acre is applied as a side-dressing when the corn is about knee high. Cultivation is about the same as for regular field corn.

Mr. Haddon says that if popcorn is grown on poor land there is quite a bit of reversion to field corn, but there is no tendency toward reversion where it is grown on good land. To prevent mixing with field corn, it should be planted at a safe distance from any other corn or planted at a time when it will tassel about two weeks earlier or later than other corn. Popcorn is usually about two weeks earlier than most field corn.

One of the reasons Mr. Haddon

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What's Wrong With Your Alfalfa Crop?

By Ralph W. Donaldson
Agronomist, Agricultural Extension Service, Amherst, Massachusetts

ALFALFA tends to be short lived in Massachusetts. A number of seemingly good seedings thin out prematurely to grass hays. Lured by its reputation for longevity, farmers have devoted expense to seed this legume, often to discover later that its fruitful period may last but little beyond that of ordinary clover. Unless its productive period can be prolonged, part of the incentive for growing alfalfa in this region is gone.

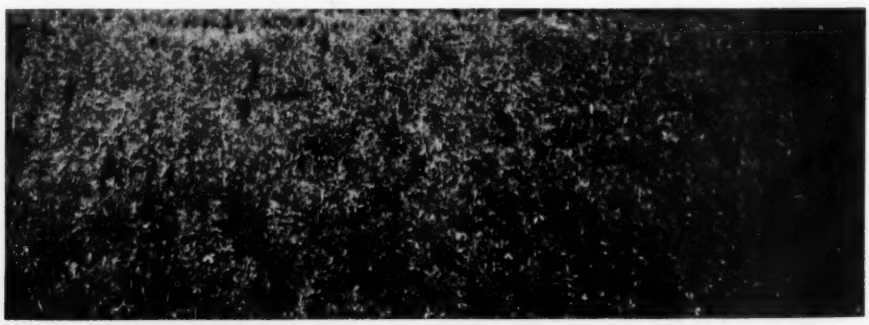
Admittedly, alfalfa is a plant fussy of its requirements. For preparation, it takes considerable lime applied gradually to plow depth for our acid soils. It needs extra superphosphate, manure, and a firm seed bed to start it, and the new seeding will soon fall a victim of either poor inoculation, close cutting of a nurse crop, or later injury from winter heaving on soils insufficiently drained. Such pitfalls lie in the path of preparation for this crop, and they wreck many first attempts even to get the crop started. However, the causes in such instances are generally obvious, remedial measures are known, and success in starting the crop seems largely a matter of education.

The future of alfalfa might seem pessimistic were it not for a proportion of growers who succeed reasonably well. In fact, it is mainly due to individual instances in which alfalfa has been maintained as vigorous stands for long periods that prompts the challenge—Why?

Serious Hazards

Climate cannot be blamed entirely for alfalfa loss, since good stands have survived its rigors. Perhaps a more frequent lack of snow cover and exposure to thawing and freezing in this area constitute the main hazard in this respect.

Nor is the varietal strain the apparent cause. Repeated tests of



Compare this alfalfa, which received potash, with that in the picture on the right.

Grimm and other variegated types of hardy strains indicate little preference over northern-grown, common alfalfas in the matter of longevity. In the matter of disease, bacterial wilt plays some part, the extent of which has not been well investigated; hopper injury also does some damage. The main causal difference, however, appears to lie elsewhere, either in the matter of soil differences, nutrients supplied, or effects upon the plant induced by time of cutting.

Wet soils or level pockets where heaving or ice sheets may occur are excluded from this discussion for alfalfa. But what of the well-drained sandy slopes of which a predominance exist in this State? Is the strongly acid nature of most of these soils the cause of short-lived stands, even though the topsoil is limed? Failure to lime them adequately no doubt is a common cause. Yet, strange as it may seem, more outstanding evidences of longevity are found today established on these acid soils than normally are found on the limestone soils of Berkshire County. In fact, it has been the relatively short life of alfalfa on these supposedly ideal limestone soils that arouses the suspicion that some nutrient supply for the plant has been neglected, or the function of the plant has been disturbed by times of cutting.

It might be plain starvation. A 3½-ton yield of alfalfa removes from the soil the equivalent of about 200 pounds of superphosphate and 300 pounds of muriate of potash per year. Farmers have been instructed to apply manure and about 1,000 pounds of superphosphate at time of seeding, perhaps 5 years' reserve phosphorus, in addition to which annual supplements of about 250 pounds are commonly supplied as top dressing. Lack of phosphorus undoubtedly is of major concern on clay-type soils of high absorptive capacity for it. Yet for these sandy soils when limed, the abovementioned rates would not seem likely to occasion the first cause of starvation.

Potash Deficiencies

But what of potash? Farmers rely on manure or the soil to supply this. Theoretically, a 15-ton rate of manure supplies just one season's requirements of this crop for potash—30 tons enough for two seasons. And more often than not, the productive period of the average stand shows a relationship to the amount of manure applied. If, further, we assume these light-textured soils to be relatively deficient in potash, usually corroborated by tests, then the missing suspect might be *potash.*

Several earlier field trials showed response of alfalfa to large amounts of potash, but often negligible results from ordinary amounts applied. Again in 1936, field trials of two sorts have been started on 15 farms growing alfalfa.

Note the "bald spots" in this section of alfalfa which did not receive any potash.

The first sort is a comparison between applying potash in the soil prior to seeding versus surface applications annually. In this test, 500- and 1,000-pound rates of muriate of potash have been worked into the seed beds (additional to the farmer's normal fertilization) for comparison with adjacent strips which receive 300-pound rates top-dressed annually.

A second type comprises top-dressing trials of superphosphate and potash. These two materials are being applied each spring at rates of 160, 320, and 640 pounds per acre each, alone and in combination.

With the new seedings just getting under way, it is yet too soon to anticipate any response from the potash applied in the soil.

Response to Top-dressing

In the top-dressing tests, only one field showed response the first season, and it was distinct on the 320- and 640-pound rates of potash. It was sufficient to induce the grower immediately to broadcast potash on the balance of his field that season. At the end of this, its second season of treatments, results are even more pronounced, with the alfalfa largely gone on the check and with alfalfa on the 320- and 640-pound potash plots decidedly good, but with no evident response to the superphosphate except as additions on the high-potash plots where it appears to be of slight benefit. The 160-pound rate of potash, although repeated this spring, may be helping slightly but appears to be insufficient. Soil tests taken when the trial was started—the first season after seeding—showed pH around 7.0, medium high phosphorus, but very low potash.

With this one exception, the rest of the field tests showed no visible response to any of the treatments the first year. This was rather anticipated, since in most cases alfalfa may thrive several years at least, because of the reserve nutrients supplied either by the grower or by the soil. These tests are expected rather to be trials of endurance.

Again in 1937, the same lack of response occurred the early part of the season. However, by autumn several other fields appeared to be showing response on the 320- and 640-pound rates of potash.

It is too soon yet to form any opinion, but at least their development is being followed with interest.

Cutting the Crop

Associated with a concept of possible starvation must be considered injury induced by frequency and time of cutting alfalfa. An experiment at the Massachusetts State College offers some evidence on this point.

Beginning 2 years ago, alfalfa has been cut at definitely spaced intervals, starting early June and extending to late September. Eight plots are cut three times, and four plots are cut twice per season. Of special interest in this experiment is the commotion that resulted from a 300-pound rate of muriate of potash (60 per cent) applied to half of all plots in June 1936. So-called "winter-killing" the following winter of 1936-37 was so severe on the no-potash ends of the three-times-late-September-cut plots, that only scattered plants remain. Excellent evidence otherwise of murdering alfalfa by wrong cutting twice before bloom and again too late in the season has been spoiled because of potash supplied on the other end where almost a perfect stand remains.

All the plots cut three times on the no-potash ends suffered more or less from "winter-killing," dependent upon periods at which cutting took place, as compared with the potash ends. Only on the plots cut twice was the alfalfa uninjured on the no-potash end and seemingly as vigorous as where the potash had been applied.

Longevity is the ultimate goal. Failure to lime adequately in preparation

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PICTORIAL

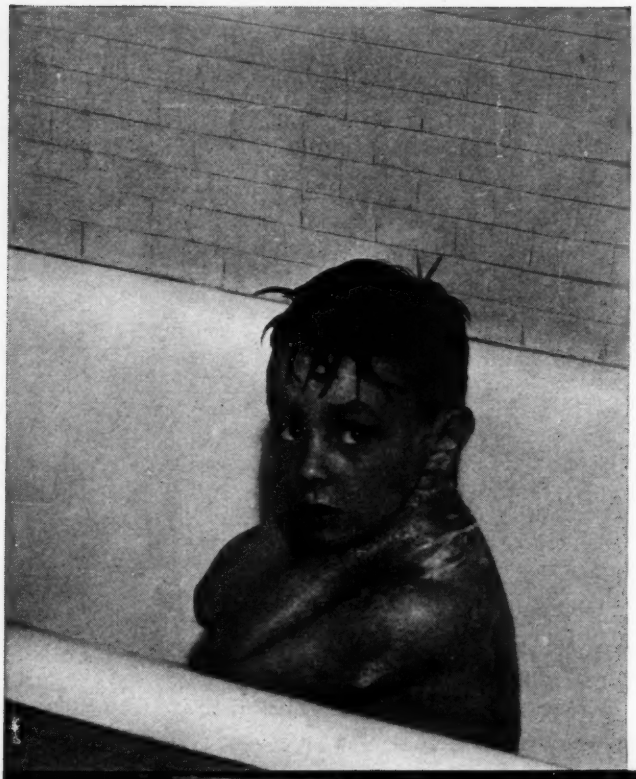
THE DEMAND FOR POULTRY IS PICKING UP!

Above: Reflections of a Snow Fence.

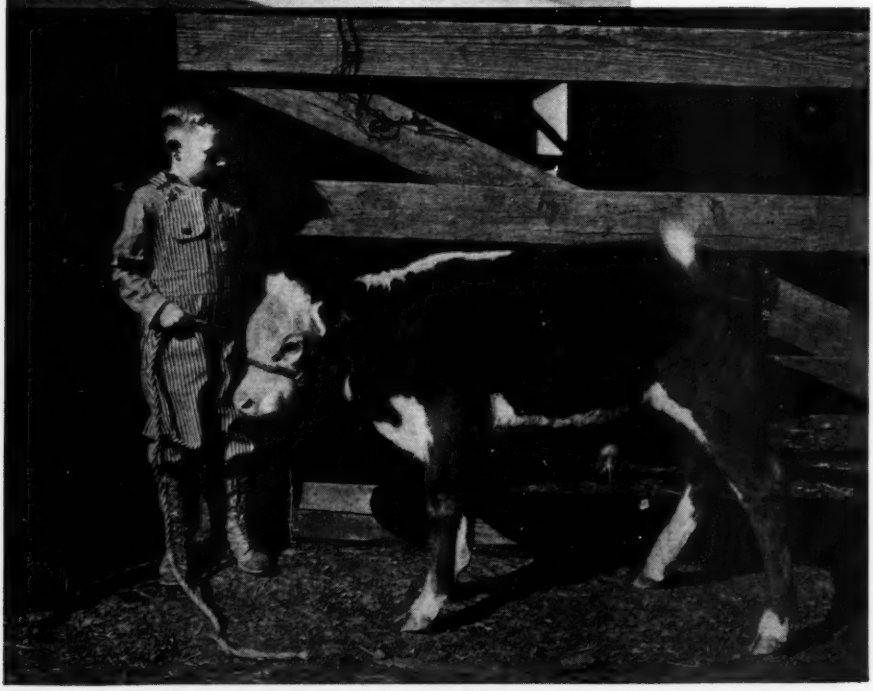
Below: Wild geese feeding in a corn field—enough to make a hunter's trigger finger itch.

Above: Snow tides will soon recede.

Below: Friends gnawing the same bone—but wait till they get to the middle!



At this age in a man's life, pride in person is not as great as pride in good livestock.



The Editors Talk

Climatic Zones and Crop Production

Whatever the Government or any other agency does about farming, the farmer has to try to run his farm more efficiently, cut out waste in work, lower production costs, and obtain maximum returns from the expenditures he makes for seeds, fertilizers, feeds, and other materials in which he invests money, time, and labor.

In years gone by we tried out varieties of crops, found one was better than another, tried to get some good seed of that variety, and let it go at that. Later, tests were made with fertilizers. Some combinations seemed to give better results than others. So, with the best variety of oats, wheat, corn, or other crop fertilized with the best combination of plant foods, what more was necessary? Was not this—a good variety and a good fertilizer—all that a man could do or hope for? For a long time it was.

But no problem stands still for very long. In this case the climate has stepped in to complicate the picture of efficient crop production and fertilizer usage. It has been found that certain varieties, with or without fertilizers, do much better in certain "soil-climatic" zones than in others. So in addition to the best variety and fertilizer analysis, the farmer is on his way to knowing the most profitable variety and fertilizer for the soil and climate in which he farms, which may be quite different from those used by another farmer some distance away.

This newer phase of efficiency in crop production was discussed in a most interesting manner at the meetings of the Ontario Agricultural and Experimental Union held at the Ontario Agricultural College, Guelph, Ontario, in January.

For agricultural purposes, southern Ontario has been divided into 15 climatic regions. Cooperative tests with field crops, using four distinct types of cooperative tests, were carried on with farmers in the several soil-climatic zones. The results of this work were reported by Dr. G. P. McRostie before the general meeting of the Experimental Union.

It was amply demonstrated that certain varieties of several crops did much better in some zones than in others, and the response to fertilizers varied with the variety and climatic zone. For instance, in one climatic zone the Alaska variety of oats was very significantly higher yielding than other varieties when fertilized—48.1 bushels per acre—but without fertilizers the variety, O. A. C. No. 72, gave the highest yield.

In another soil-climatic region, however, the results obtained with testing the same four varieties of oats were quite different. In this test the Banner Oat gave the highest yield, both fertilized and unfertilized, 42.5 bushels per acre fertilized compared with 26.27 for the Alaska. Other results could be

cited, but these indicate the type of result that is being obtained by relating variety tests and fertilizer treatment to soil-climatic zones.

These preliminary investigations, in which the agricultural section of the Ontario Research Foundation cooperated, point the way to a vast field of experimentation to help the farmer along his endless road of more efficient crop production. It is possible that we shall soon have "zoning" in the corn-growing areas where in recent years much attention has been given to the development of corn hybrids which would be better adapted to various soil and climatic conditions, and where recent tests have conclusively shown that hybrids which yield well without fertilization will usually do even better with proper fertilization.

King (?) Cotton In North Carolina

While cotton may popularly be called King in North Carolina, in the unromantic light of cold statistics, it has to give way to tobacco, according to W. H. Rhodes in the December 1 issue of the *Agricultural Review,* issued by the North Carolina State Department of Agriculture. Not only must cotton take second place in the value of crops produced in this State, but it is well below tobacco in the agricultural hierarchy of the State. The lowly corn crop can hold its head almost as high as cotton, and not far below come the combined vegetable crops.

The cash value of tobacco in 1936 is given as over 100 millions of dollars, with cotton, including lint and seed, valued at a little under 50 millions. Corn has a value of about 40 millions, not counting the feed value of the stover. Adding the grain and stover values probably would put corn about even with cotton. Vegetable crops, including Irish and sweet potatoes, had a total value of about 30 millions. Hay crops are fifth, being valued at over 11 millions. Peanuts are not far behind, while somewhat lower are the values of wheat, apples, peaches, oats, soybeans, strawberries, cabbage, lespedeza seed, and sorghums for syrup and feed. All of these crops have values of between 1 and 10 million dollars.

We would be the last to disparage the importance of cotton in the agriculture of North Carolina. It would be difficult indeed to replace its value to the many farmers of the State growing the crop. However, let us give due credit and attention to the other crops which in aggregate value far overshadow cotton. It is these crops which keep the agriculture of the State in a comparatively good condition year in and year out, and put it fifth among all the States of the country in value of agricultural crops produced.

These figures tell a far more important story than the mere relative values of the important crops grown in North Carolina. They show that many of the farmers have found that it does not pay to put all the eggs in one basket. Thus, instead of putting all their effort into growing only one cash crop, such as cotton, they are growing many cash crops, as well as a number of crops for consumption on the farm. In the long run, this is undoubtedly the safest way to farm and is the program the agricultural experts long have been advocating. A diversified farming system not only is most likely to produce a moderately good income each year, but is by far the best from the viewpoint of soil conservation.

REVIEWS

This section contains a short review of some of the most practical and important bulletins, and lists all recent publications of the United States Department of Agriculture and the State Experiment Stations relating to Fertilizers, Soils, Crops, and Economics. A file of this department of BETTER CROPS WITH PLANT FOOD would provide a complete index covering all publications from these sources on the particular subjects named.

Fertilizers

¶ Summarizing the extensive fertilizer experiments on truck soils in the southeastern truck and cotton belt, and particularly those on North Carolina soils, Bulletin 316 of the North Carolina Agricultural Experiment Station, entitled "Adapting Standard and High Analysis Fertilizers to Truck Crop Soils," suggests methods of improving fertilizer practice in this area with substantial savings in fertilizer costs. The authors, J. J. Skinner and R. A. Lineberry, of the Bureau of Plant Industry, cooperating in these studies, and H. B. Mann and E. R. Collins, conclude that generally the double strength grades may be as efficient as single strength fertilizers for truck and cotton soils, resulting in lower cost to growers. It is estimated that increasing the plant-food concentration in commercial fertilizers from 15 to 20 or 25 per cent effects a saving of 17 to 23 per cent of the fertilizer cost.

Differences in efficiency of the various complete fertilizers may be due to differences in their composition. Among these listed by the authors are sources of nitrogen, differences in the acid-forming properties of the fertilizers, content of secondary plant-food elements as calcium and magnesium, and the content of minor nutrients such as copper, manganese, boron, and zinc.

The data secured in truck and cotton experiments indicate that the use of concentrated fertilizers containing soluble but relatively leaching-resistant sources of nitrogen should give good results and materially reduce the cost of crop production. High analysis fertilizers, as well as the standard fertilizers, have given best results when applied to the side of the seed at planting. On soils from which fertilizers are readily leached, application of part of the nitrogen as a side-dressing is said to be preferred.

Fertilizers for truck crops and cotton should be neutral or non-acid-forming for the acid soils of the State, unless they are used with lime. The acidity of the fertilizer and its content of calcium and magnesium are especially important factors influencing the efficiency of Irish potato and cotton and sweet potato fertilizers. Data from the strawberry experiments near Chadbourn confirm the results obtained in experiments with other truck crops. They indicate that there is little or no difference between sources of nitrogen when they are used in non-acid standard fertilizers. However the high analysis fertilizers were superior to the single strength fertilizers even though the latter were non-acid-forming.

The results of the experiments with sources of nitrogen and high analysis fertilizers with truck crops in general substantiate those secured with cotton.

"Fertilizer Experiments with Greenhouse Tomatoes," Agr. Exp. Sta., Urbana, Ill., Bul. 438, Nov. 1937, J. W. Lloyd and B. L. Weaver.

"Nitrogenous Fertilizers for Growing Tobacco," Agr. Exp. Sta., Amherst, Mass., Bul.

346, *Oct.* 1937, *A. B. Beaumont and M. E. Snell.*

"Tobacco Fertilizer Recommendations for 1938," *Agr. Exp. Sta., Raleigh, N. C., Agron. Inf. Cir.* 108, *Aug.* 1937, *R. Y. Winters, Director.*

"Fertilization of Pastures for Milk Production," Agr. Exp. Sta., Blacksburg, Va., Bul. 309, *Sept.* 1937, *A. D. Pratt and C. W. Holdaway.*

"Report of the Chief of the Bureau of Chemistry and Soils, 1937," *U. S. D. A., Washington, D. C., Henry G. Knight, Chief.*

"Production and Agricultural Use of Sodium Nitrate," U. S. D. A., Washington, D. C., Cir. 436, *June* 1937, *Albert R. Merz and C. C. Fletcher.*

Soils

¶ Designed with the view of providing instructional material for teachers of vocational agriculture, Volume 13, Numbers 9-12 of the Agricultural Education series (Clemson Agricultural College, South Carolina, cooperating with the State Department of Education) furnishes detailed information pertaining to soil studies that should be helpful to farmers and farm boys of the State. In this publication, entitled "The Significance of Soil Types in Farming," the editors, W. G. Crandall, et al., clarify a host of problems that are often closely related to soil types. About thirty years ago it was commonly believed that the natural fertility of the soil was inexhaustible and that the soils could not wear out. Today we know that soil fertility is exhaustible, even under the best cropping systems, and many farmers are tilling worn-out soils. In areas affected by erosion, the destruction processes are greatly aggravated and accelerated.

The physical characteristics of the subsoil are most important factors in determining the movements of soil moisture, proper drainage, and root penetration. Knowing only certain facts of the surface soils, farmers are seriously handicapped in effectively managing their soils. As this publication is edited primarily for trained agricultural instructors, thorough dissemination of the contents should greatly enable them to point out certain facts to farmers and farm boys so that they can understand more about the soils they are cultivating. ¶ The soil and fertilizer requirements for the production of sweet corn are among the important topics stressed in U. S. D. A. Farmers Bulletin 1634 (Revised), entitled "Growing Sweet Corn for the Cannery," by J. H. Beattie. This crop, which ranks among the three most important canned vegetable commodities, is produced in commercial quantities in several States in the northern half of the United States. The Bulletin states that sweet corn may be successfully produced in growing seasons too short for the maturing of most types of field crops. It fits well into the farm crop rotation and occupies the land a shorter time than certain other crops, giving an increased use of green manure and cover crops. The canner and farmer in this industry are interdependent and will succeed or fail together. Operations should be attempted only in regions where yields can be obtained on land of medium value.

A well-drained, moderately heavy loam, abundantly supplied with organic matter, will probably give the best results. Where heavy clays are used, their physical character should be improved by turning under large quantities of manure and cover crops. The kind and amount of fertilizer required for sweet corn depend upon the soil conditions. In general, a fertilizer containing 4 to 5 per cent nitrogen, 8 to 10 per cent phosphoric acid, and 5 to 6 per cent potash will be found satisfactory. The rate of application varies from 200 to 600 pounds per acre, the lower amount being used in conjunction with barnyard manure. Where more than 200 pounds of fertilizer per acre are used, the excess should be broadcast and worked in during the final working of the soil before planting. Up to this quantity

may be applied near the row at planting time, but not placed in contact with the seed, the author recommends. Other subjects discussed include preparation of the land, varieties, planting, and cultivation and care.

"Slick Spots in Western Colorado Soils," Agr. Exp. Sta., Fort Collins, Colo., Tech. Bul. 20, Oct. 1937, Robert Gardner, Robert S. Whitney, Alvin Kezer.

"Soil Erosion Control in Farm Operation," Agr. Ext. Serv., University Farm, St. Paul, Minn., Sp. Bul. 170, Rev. Sept. 1937, H. B. Roe and J. H. Neal.

"Land Classification in West Virginia Based on Use and Agricultural Value," Agr. Exp. Sta., Morgantown, W. Va., Bul. 284, Nov. 1937, G. G. Pohlman.

"Land-class Maps of West Virginia, I-Land Classification, II-Slope of Land, III-Types of Soil," Agr. Exp. Sta., Morgantown, W. Va., Bul. 285, Nov. 1937, G. G. Pohlman.

"What Program of Erosion Control Is Needed in America?" Agr. Ext. Serv., Madison, Wis., Sten. Cir. 191, Sept. 1937, Kenneth S. Davis and Martin P. Andersen.

"Report of the Chief of the Soil Conservation Service, 1937," U. S. D. A., Washington, D. C., H. H. Bennett, Chief.

"Soil Survey Manual," U. S. D. A., Washington, D. C., Misc. Pub. 274, Sept. 1937, Charles E. Kellogg.

"Sources of Moisture for Precipitation in the United States," U. S. D. A., Washington, D. C., Tech. Bul. 589, Oct. 1937, Benjamin Holzman.

"Soil and Water Conservation in the Pacific Northwest," U. S. D. A., Washington, D. C., Farmers' Bul. 1773, July 1937, E. M. Rowalt.

"Conserving Corn Belt Soil," U. S. D. A., Washington, D. C., Farmers' Bul. 1795, Nov. 1937, Glenn K. Rule.

Crops

¶ Of particular interest to celery growers of Michigan is the recently published Circular Bulletin 165 of the Michigan Agricultural Experiment Station, entitled "Celery Production in Michigan," by C. H. Mahoney, P. M. Harmer, Ray Nelson, and Ray Hutson. The bulletin devotes considerable attention to the types of muck soil and recommended soil amendments and fertilizer for the commercial production of this crop. Very practical information regarding varieties and cultural practices and methods for the control of insects and diseases are also discussed in detail. Since celery is a crop which has a high water requirement, muck soil, with its high water-holding capacity, is ideally suited. Although rotation with other crops is advisable, it is possible to produce this crop almost continuously year after year on the same soil if a proper system of management and careful disease and insect control measures are practiced.

A very comprehensive chart giving recommendations for the use of fertilizer, sulphur, salt and borax is included in the bulletin. Concise information regarding the different materials and quantity to use under varying soil conditions is shown by the chart. The proper ratio of phosphate to potash in the fertilizer mixture depends chiefly on the time of producing the crop and on the reaction of the soil. For early celery a good supply of phosphate in the mixture tends to bring along the crop faster. On the middle and late crops of celery, more potash is advisable in order to produce a larger stalk and improve the eating and keeping quality. While a 3-12-15 mixture is suitable for the early crop, an 0-8-24 generally will produce the best results on the late celery crop. The very acid muck requiring lime to produce satisfactory growth will give best results from a ratio that is intermediate between the above mixtures. Unless the soil is strongly acid, lime should not be applied, the authors state. Cracked stem on alkaline muck can be prevented by use of sulphur or manganese sulphate. Studies on Michigan mucks show that either borax or boric acid is effective in decreasing cracked stem on both acid and alkaline mucks.

Methods of plant production and setting plants, proper field management, and other important points worthy of consideration but too numerous to include here, are clearly defined by the authors.

¶ "What's New in Farm Science," Part I of Wisconsin Agricultural Ex-

periment Station's 54th Annual Report, tells just what the title implies. Full of interesting reading, the report contains practical information resulting from research on animal nutrition, diseases and breeding; dairy products; feeding and clothing the family; farm income and welfare; farm engineering; game management; and bacteria, molds, and yeasts. Part II of this report will cover such subjects as livestock feeding; soils; plant diseases; field crops, etc., the Station announces. On the inside cover page is listed a number of queries under the heading "Did you know——." Opposite each is given the exact page to look in finding the answers. The subjects treated in this report will be found very practical and instructive.

"A Study of the Effect of Pollen upon the Length of Cotton Fibers," Agr. Exp. Sta., Tucson, Ariz., Tech. Bul. 70, Sept. 15, 1937, E. H. Pressley.

"Irish Potato Production, Harvest, and Storage," Agr. Ext. Serv., Little Rock, Ark., Ext. Cir. 344, June 1937, William G. Amstein and J. H. Heckman.

"Cheaper Feed Through Pastures," Agr. Ext. Serv., Little Rock, Ark.

"The Chemical Control of St. Johnswort," Agr. Exp. Sta., Berkeley, Calif., Bul. 615, Nov. 1937, R. N. Raynor.

"Golden Anniversary Annual Report Colorado Experiment Station 1936-37," Agr. Exp. Sta., Fort Collins, Colo., July 1, 1937, E. P. Sandsten.

"Nutritional Characteristics of Some Mountain Meadow Hay Plants of Colorado," Agr. Exp. Sta., Fort Collins, Colo., Tech. Bul. 21, Oct. 1937, J. W. Tobiska, Earl Douglass, C. E. Vail, Melvin Morris.

"A Preliminary Report on Frenching of Tung Trees," Agr. Exp. Sta., Gainesville, Fla., Bul. 318, Dec. 1937, Walter Reuther and R. D. Dickey.

"Dahlia Variety Test, 1937," Agr. Exp. Sta., Experiment, Ga., Cir. 114, Dec. 1937, H. L. Cochran, David D. Long, and B. E. Phillips.

"Regeneration in Various Types of Apple Wood," Agr. Exp. Sta., Ames, Iowa, Res. Bul. 220, Sept. 1937, V. T. Stoutemyer.

"Hybrid Corn in Iowa," Agr. Exp. Sta., Ames, Iowa, Bul. 366, Aug. 1937, A. A. Bryan and R. W. Jugenheimer.

"Barley in Iowa," Agr. Exp. Sta., Ames, Iowa, Bul. 367, Oct. 1937, L. C. Burnett and Chas. S. Reddy.

"Woody Plants for New England Gardens, Parks and Roadsides," Agr. Exp. Sta., Amherst, Mass., Bul. 345, Aug. 1937, George Graves.

"Fruit Notes—December 1937," Agr. Ext. Serv., Amherst, Mass., Mimeo., W. H. Thies.

"The Massachusetts Commercial Vegetable Grower," Agr. Ext. Serv., Amherst, Mass., Vol. 1, No. 8, Dec. 1937.

"Tung Oil Production in Mississippi," Agr. Ext. Serv., State College, Miss., Ext. Bul. 87, Oct. 1937, Chesley Hines.

"Cotton Varieties, Natchez, 1937, Results for 1933-37," Agr. Exp. Sta., State College, Miss., Inf. Sheet 125, Dec. 1937, J. R. Ricks, Director.

"Forest Restoration in Missouri," Agr. Exp. Sta., Columbia, Mo., Bul. 392, Nov. 1937, F. B. Mumford, Director.

"Photoperiodism and Enzyme Activity in the Soybean Plant," Agr. Exp. Sta., Columbia, Mo., Res. Bul. 271, Dec. 1937, Audrey D. Hibbard.

"Grape Production in New York," Cornell Univ. Agr. Ext. Serv., Ithaca, N. Y., Bul. 375, Aug. 1937, M. B. Hoffman.

"Experiments with Cover Crops on Long Island," Cornell Univ. Agr. Exp. Sta., Ithaca, N. Y., Bul. 677, June 1937, P. H. Wessels and John D. Hartman.

"Fall Gardening," Agr. Ext. Serv., Stillwater, Okla., Gen. Ser. 48, Cir. 102, 1937, D. C. Mooring.

"4-H Club Horticultural Manual," Agr. Ext. Serv., Stillwater, Okla., Club Ser. 91, Cir. 316, Revised 1937, D. C. Mooring.

"Cotton in Oklahoma, 4-H Crop Club Manual Series," Agr. Ext. Serv., Stillwater, Okla., Club Ser. 99, Cir. 349, 1937, Roy W. Ellithorp.

"Effect of Agricultural and Home Economics Research on Oregon's Agricultural Progress, A Report of Activities and Accomplishments for Biennium Ending June 30, 1936," Agr. Exp. Sta., Corvallis, Oreg., Sta. Bul. 350, June 1937, Ralph S. Besse.

"Extension Work in South Carolina 1936, A Review of Agricultural Progress," Agr. Ext. Serv., Clemson, S. C., D. W. Watkins, Director.

"Catalogue of the Flora of Texas," Agr. Exp. Sta., College Station, Brazos County, Tex., Bul. 550, July 1937, V. L. Cory and H. B. Parks.

"Valuable Plants Native to Texas," Agri. Exp. Sta., College Station, Brazos County, Tex., Bul. 551, Aug. 1937, H. B. Parks.

"Losses of Vitamin A and Carotene from Feeds During Storage," Agr. Exp. Sta., College Station, Brazos County, Tex., Bul. 557, Oct. 1937, G. S. Fraps and A. R. Kemmerer.

"Department of Agriculture-Immigration of Virginia," Richmond, Va., Bul. 355, Dec. 1937.

"Spring Bulbs for the Home Grounds," Agr. Ext. Serv., Madison, Wis., Sten. Cir. 192, Sept. 1937, James G. Moore.

"Growing Dutch Bulbs Indoors," Agr. Ext.

Serv., Madison, Wis., Sten. Cir. 193, *Sept.* 1937, *James G. Moore.*

"Report of the Chief of the Bureau of Plant Industry, 1937," *U. S. D. A., Washington, D. C., Frederick D. Richey, Chief.*

"Flaxseed Production in the Far Western States," U. S. D. A., Washington, D. C., Farmers' Bul. 1793, *Sept.* 1937, *A. C. Dillman and L. Gordon Goar.*

"American Grape Varieties," U. S. D. A., Washington, D. C., Cir. 437, *Sept.* 1937, *I. W. Dix and J. R. Magness.*

"Rhubarb Production," U. S. D. A., Washington, D. C., Leaf. 126, *J. H. Beattie.*

"Irrigated Crop Rotations at the Huntley (Mont.) Field Station, 1912-35," *U. S. D. A., Washington, D. C., Tech. Bul.* 571, *June* 1937, *Stephen H. Hastings and Dan Hansen.*

Economics

¶ Since there is so much current interest in grain storage and stabilizing crop prices through storage and loans, the recent publication of the Iowa State College of Agriculture "Stabilizing Corn Supplies by Storage," by Geoffrey Shepherd and Walter W. Wilcox, is very pertinent. The bulletin is written in an easy-to-read style and discusses briefly the possibilities of stabilizing corn supplies, prices, and livestock production, and prices through storage of corn.

A farmer who plants corn in the Spring may harvest a normal crop, a bumper crop, or possibly no crop at all. And likewise, a dependent hog producer may sell his hogs for a fair price, a very good price, or a price far below the cost of production. The instability in agriculture is due to two factors: (1) changes in supply of farm products, and (2) changes in the demand. While it has been very evident that changes in demand are a very important factor, changes in supply constitute a definite problem in agriculture at the present time. The bulletin confines itself to a study of the effects of changes in supply of corn-belt products.

Unfortunately, from the storage standpoint, large corn yields and small yields do not follow each other in regular fashion, but it is more a matter of chance, such as flipping a coin. Two large crops may follow each other, or two small crops may follow in consecutive order. The extreme in variation, however, above the normal line is less than the variation extremes below the line, but during the past 68 years there has been a considerably greater number of crops with yields above normal than below normal. From this it is apparent that large crops are more likely to follow each other than small crops. It is further noted that fluctuations in production and yield of corn are much greater in the western edge of the corn belt than in the eastern and central sections of the belt. From this it is noted that storage operations in the western edge of the belt would have more effect on supply and price than storage operations in the eastern and central parts. Approximately 70 per cent of all feed other than pasture produced in Iowa is represented by the corn crop, and approximately 85 per cent of the corn crop in Iowa is consumed as livestock feed, the other 15 per cent being sold as cash grain. If the supplies of corn could be stabilized through some sort of storage program, a great part of the fluctuation in the supply of feed for livestock would be eliminated.

In the past, farmers have stored approximately 3.8 per cent of their corn crops. This percentage has fluctuated from as little as 1 per cent to as much as 11 per cent. Of course the larger the crop the greater the carry-over.

It is further pointed out that the cheapest and perhaps the most effective place to store corn is on the farm. While corn stored in a terminal elevator may be more readily accessible from the standpoint of one market, it is difficult to take advantage of favorable prices in other markets, whereas corn stored on the farm can to a certain extent take advantage of them. The cost of storing corn on the farm, including the interest on the cost of the crib, losses due to rodents, insurance, etc., amounts to about 3c per bushel per year, and it

might be expected that a crop would often remain in a crib as long as 3 years.

The effect of storing corn on hog production and prices would be expected to be of a stabilizing nature. Under our present system of things, hog production is drastically reduced in years of short corn crops and is increased somewhat in years of large crops, but due to physical limitations, it is impossible for hog producers to snap back from low levels of production as rapidly as the supplies of corn change. Therefore, a small corn crop usually causes a greater reduction in pork production than a large crop produces in the way of an increase. An analysis of the cash value of a small pork crop and a large one discloses that in the past a large production of pork is worth less than a small crop, and that the average value of a large or a small hog crop is less than a normal one. From the standpoint of the hog producer, it would be an advantage to stabilize his production and thus tend to stabilize his income.

The effect of stabilization of supplies on cash corn prices would be to level off the ups and downs of price changes. The ordinary way is for low prices and storage to result from large production. Under a storage and loan program the mechanism would tend to work in the opposite direction. Instead of the amount of corn consumed determining the price level, the loan value would set the price and determine the amount consumed, and thus determine the quantity stored.

According to the conclusions set forth in the bulletin, a corn storage and loan program apparently would be applicable to livestock and corn producers in the Midwest. How far a program of this type could be carried to other crops is not indicated. It would seem that a program of this kind would work better on corn than practically any other crop, in view of the fact that so much of the crop is consumed as feed for livestock and such a very small quantity is ever exported. While a storage and loan program might work in the case of such commodities as wheat and cotton which enter into international trade, the problems which would confront the administrators would be a great deal more difficult than in the case of corn.

¶ Although Illinois is still in the early stages of the development and use of commercial fertilizer, they publish a very comprehensive report on fertilizer tonnages sold within the State. The data are compiled by the Department of Agronomy at the University of Illinois. According to their 1936 tonnage report as compared to 1935, the total tons of mixed fertilizer increased 47 per cent from 15,381 tons to 22,576 tons. While the tonnage of materials increased only 3 per cent from 8,446 to 8,732 tons, the tonnage of superphosphate increased 15 per cent from 3,600 to 4,133 tons. The total tonnages of materials and fertilizers increased 31.4 per cent from 23,827 tons to 31,308 tons. The 10-6-4 advanced from 40th to 11th place in tonnage, and 2-14-4 dropped from 15th to 41st place. The 2-12-6 is the leading single analysis, with an increase of from 13.1 per cent of the total of mixed goods in 1935 to 19 per cent in 1936. Twenty-two new analyses were added and three were dropped, making a total for 1936 of 81 different analyses.

Only one of the new analyses contained less than 20 per cent plant food, and the average plant-food content of those added was 31 per cent. In 1934, 60 per cent of all the mixed goods contained 20 per cent or more plant food, and in 1936, 70 per cent contained more than 20 per cent plant food. In 1929 the average of the 10 leading analyses was 1.9-12.5-6.0. In 1934 the average of the 10 leading analyses was 2.2-11.1-7.7, and in 1936 the average was 1.9-11.6-9.2. About 14,168 tons of mixed goods in 1936

were reported as Spring sales, and 8,408 tons were sold in the Fall.

"Florida Citrus Prices, II," Agr. Exp. Sta., Gainesville, Fla., Bul. 317, Nov. 1937, A. H. Spurlock and Marvin A. Brooker.

"Farm Tenure in Iowa, IV. Farm Tenure Conditions in Palo Alto County," Agr. Ext. Serv., Ames, Iowa, Bul. 364, Aug. 1937, Rainer Schickele.

"This Business of Farming in Michigan—1936," Agr. Ext. Serv., East Lansing, Mich., Ext. Bul. 189, Dec. 1937, C. O. May and H. A. Berg.

"1937 Fertilizer Bulletin" (Fall Season 1936, Spring 1937), Dept. of Agr., Lansing, Mich., John B. Strange, Commissioner.

"Minnesota Farm Business Notes, The Farm Program for 1938," Agr. Ext. Serv., St. Paul, Minn., Mimeo. 181, Jan. 20, 1938, Andrew Boss.

"Current Economic Facts for Mississippi Farmers, No. 1—Yearly Average Cotton Consumption and Industrial Production in the U. S., 1920 to 1936; No. 2—Yearly U. S. Cotton Exports, 1929 to 1936; No. 3—Principal Sources of Mississippi Cash Farm Income Average 1934-1935; No. 4—Cotton—Average Parity Price and Average Price per Pound Received by Farmers 1923-24 to 1936-37; No. 5—Cotton—World Supplies of All Kinds American and Foreign Growths 1920 to Date," Agr. Ext. Serv., State College, Miss., July 15, Aug. 15, Sept. 15, Oct. 15, and Nov. 15, 1937, E. H. White, Director.

"1938 Agricultural Outlook for Mississippi," Agr. Ext. Serv., State College, Miss., Ext. Bul. 89, Jan. 1938, E. H. White, Director.

"Proposed Adjustments in the Farm Tenancy System in Missouri," Agr. Exp. Sta., Columbia, Mo., Res. Bul. 270, Dec. 1937, John H. Dickerson.

"New Farming Systems Applied to Southwest Missouri Upland Farms," Agr. Ext. Serv., Columbia, Mo., Res. Bul. 370, Oct. 1937, Donald B. Ibach.

"Economic Studies of Vegetable Farming in New York, III. Truck-crop Production and Price," Cornell Univ. Agr. Exp. Sta., Ithaca, N. Y., Bul. 679, Sept. 1937, E. G. Misner.

"Farm Economics," Cornell Univ. Agr. Ext. Serv., Ithaca, N. Y., No. 104, Dec. 1937.

"Current Farm Economics," Agr. Exp. Sta., Stillwater, Okla., Ser. 40, Vol. 10, No. 6, Dec. 1937, Lippert S. Ellis.

"Labor Input on West Virginia Farms," Agr. Exp. Sta., Morgantown, W. Va., Bul. 286, Dec. 1937, L. F. Herrmann, R. O. Stelzer, and W. W. Armentrout.

"Grade, Staple Length, and Tenderability of Cotton in the United States 1928-29 to 1935-36," U. S. D. A., Washington, D. C., Stat. Bul. 60, July 1937.

"Carlot Shipments of Fruits and Vegetables from Stations in the United States for the Calendar Years 1934 and 1935," U. S. D. A., Washington, D. C., Stat. Bul. 61, Sept. 1937.

"Consumption and Production of Tobacco in Europe," U. S. D. A., Washington, D. C., Tech. Bul. 587, Nov. 1937, J. B. Hutson.

"Sales of Cotton for Future Delivery, 1925-26 to 1935-36," U. S. D. A., Washington, D. C., Misc. Pub. 282, Sept. 1937, Ronald E. Betts.

"What Is the Cotton Situation?" U. S. D. A., AAA, Washington, D. C., G-82, Dec. 1937.

"Determination of Farming Practices to Be Carried Out in Connection with the Production of Sugar Beets and Sugarcane During the Crop Year 1937, Pursuant to Subsection (e) of Section 301 of the Sugar Act of 1937," U. S. D. A., AAA, Washington, D. C., S. D. No. 14, Dec. 20, 1937.

"Sugar Consumption Requirements and Quotas for the Calendar Year 1938," U. S. D. A., Washington, D. C., AAA, G. S. Q. R., Series 5, No. 1, Dec. 20, 1937, H. A. Wallace.

"Facts Relating to the Agricultural Situation in 1938," U. S. D. A., Washington, D. C., Ex Parte 123, Jan. 1938, L. H. Bean.

"Estimated Monthly Cotton Marketings by Farmers in Percentage of Year's Sales, Crop Years 1924-1936," U. S. D. A., Washington, D. C., Mimeo., Jan. 1938.

"Disposition of Cottonseed, Crop Years 1909-1936, by States," U. S. D. A., Washington, D. C., Mimeo., Oct. 29, 1937.

"Outstanding Farm-Mortgage Loans of Leading Lending Agencies," U. S. D. A., Washington, D. C., Mimeo., Dec. 1937, Norman J. Wall.

"The Preparation of Statistical Tables, A Handbook," U. S. D. A., Washington, D. C., Mimeo., Dec. 1937, A. G. Black.

A Los Angeles patrolman had brought in a Negro woman somewhat the worse for wear, and the desk sergeant, with his very best scowl, roared:

"Liza, you've been brought in for intoxication!"

"Dat's fine!" beamed Liza. "Boy, you can start right now!"

Patricia: "Harry surprised me by telling me that we're going to take our honeymoon in France."

Nellie: "How nice! And how did he spring it on you?"

Patricia: "He said as soon as we were married he would show me where he was wounded in the war."

J. W. Haddon Grows Popcorn for Profit

(*From page 19*)

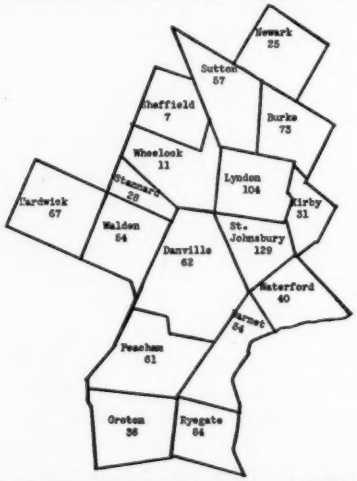
turned to popcorn was that there is a ready market for his entire output. He can sell all that he can grow at a satisfactory price. Last year he sold 100,000 pounds to one buyer. All popcorn is sold in the ear.

Mr. Haddon believes that only a few producers can grow popcorn successfully as its production requires attention to important details such as careful selection of seed and precaution against the mixing with other corn.

Using Soil Tests to Get the Picture

(*From page 18*)

agent in making recommendations to the farmer for the best treatment in the way of necessary plant food. The farmer himself getting tests made regularly of his entire tillable or pasture acres can have for himself a complete picture of his farm, because he receives a copy of his tests and can make reference to them from time to time. The tests also show that all the expenditure for fertilizer should not be made on any one or even two of the necessary plant foods, but that an even balance should be kept with nitrogen, phosphorus, and potash, keeping in mind what the tests show, what crop is being grown, and the history of the field. While phosphorus has received a great boost in the past few years, the need of potash should also be studied and maintained in any soil fertility program in Caledonia County.



Map of Caledonia County showing distribution of tests by towns.

TABLE SHOWING DISTRIBUTION OF SOIL TESTS BY THE VARIOUS ANALYSIS GROUPINGS

Towns	Nitrogen							Phosphorus						Potash					
	VH	H	MH	M	L	VL	VH	H	MH	M	L	VL	EH	VH	H	MH	M	L	VL
Barnet	2	2	6	13	16	15	..	1	6	20	21	10	2	3	3	5	7	22	14
Burke	2	4	14	20	14	19	..	1	4	29	36	5	..	2	9	2	14	41	11
Danville	2	2	7	14	12	25	..	1	6	28	23	6	1	4	..	3	9	40	11
Groton	2	4	3	11	8	8	3	3	5	7	16	1	2	2	2	4	8	18	2
Hardwick	4	4	3	4	17	25	..	2	3	26	35	2	..	..	..	3	2	46	3
Kirby	1	3	3	6	5	13	..	..	1	4	10	15	..	1	..	2	5	13	11
Lyndon	3	10	13	14	30	34	1	2	5	31	43	22	..	2	5	6	11	58	17
Newark	..	..	2	6	7	10	..	..	..	6	15	5	..	..	..	..	..	18	8
Peacham	1	4	8	17	11	20	1	..	4	25	22	1	..	..	3	5	8	37	6
Ryegate	1	5	12	17	14	35	1	..	5	29	40	7	..	3	6	4	9	43	19
St. Johnsbury	6	11	12	22	37	41	3	13	14	40	36	21	..	2	12	12	12	58	19
Sheffield	1	..	1	..	3	2	..	..	..	1	4	2	..	..	..	..	2	4	2
Stannard	..	3	4	4	5	12	..	3	2	6	16	4	..	..	..	7	5	15	4
Sutton	2	..	5	8	13	29	..	5	5	14	22	11	..	2	2	5	7	28	15
Walden	9	3	5	9	11	17	..	1	2	13	18	20	..	3	2	1	9	29	12
Waterford	2	6	4	5	9	14	..	..	1	11	13	5	..	2	1	..	10	16	7
Wheelock	..	1	3	4	2	1	..	..	..	5	7	..	..	..	1	..	6	6	..
Totals	38	62	105	174	214	320	9	32	63	295	377	137	5	26	46	59	124	492	161

NOTE: EH—Extra high. VH—Very high. H—High. MH—Medium high. M—Medium. L—Low. VL—Very low.

Fertilizer Developments in Mississippi

(*From page* 15)

by the Mississippi Experiment Station and are as follows:

600	pounds	of	a	4-8-8	gave	an	average	increase	of	749	pounds	of	seed	cotton
600	"	"	"	4-8-6	"	"	"	"	"	690	"	"	"	"
600	"	"	"	4-8-4	"	"	"	"	"	590	"	"	"	"
600	"	"	"	4-8-2	"	"	"	"	"	390	"	"	"	"
600	"	"	"	4-8-0	"	"	"	"	"	140	"	"	"	"
600	"	"	"	8-8-4	"	"	"	"	"	545	"	"	"	"
600	"	"	"	6-8-4	"	"	"	"	"	578	"	"	"	"
600	"	"	"	4-6-4	"	"	"	"	"	550	"	"	"	"
600	"	"	"	4-4-4	"	"	"	"	"	475	"	"	"	"

The average yield of unfertilized plots was 889 pounds of seed cotton

During a part of the time rate tests were conducted on the same land and ran from 600 to as much as 2,400 pounds of a 4-8-4 mixture per acre, the results going to show that 600 pounds of a 4-8-8 gave as an average about as great an increase as any higher amount of a 4-8-4. During the same years similar tests were conducted on hill soils, but had to be changed several times, the results as a whole going to indicate that such hill lands respond best to higher percentages of nitrogen and lower percentages of potash than the bottom soils.

In connection with the above, it may be said that for some years after the establishment of experiment stations in the State it was believed and taught that because Mississippi soils generally contained a relatively high percentage of potash compared with phosphorus and nitrogen, as determined by chemical analyses, such soils did not need potash. As a matter of fact, many of the earlier field tests indicated that potash was not so necessary as nitrogen and phosphorus. But almost invariably when such tests were continued for a number of years on the same land, as at Holly Springs and Poplarville (with which the writer is most familiar), the need for all three of these plant foods has been apparent. Except on the alluvial soils of the Mississippi Delta, practically all the soil types of the State require all three plant foods in a fertilizer, and even these Delta soils along their eastern border, where affected by washings from the nearby hills, are showing the need for potash to control cotton rust, which is becoming so destructive to cotton yields on what is locally known as the foothills.

Nitrogen is the most seriously deficient plant food in Mississippi soils, taken as a whole, and our farmers are coming more and more to appreciate the importance of supplying at least a part of it with legumes. But these legumes, both summer and winter, seem to accomplish less good in the hills than in the Delta, apparently because they do not get sufficient minerals in the hills to meet their demands. Thus the Delta plants 2/3 of the winter legume acreage in the State, while occupying only about 1/6 of the land area. Too, such summer legumes as cowpeas and soybeans apparently increase soil fertility, as measured by succeeding crops of corn or cotton, much faster in the Delta than they do in the hills. The obvious conclusion is that these legumes should be given more liberal amounts of the mineral plant foods rather than continue to regard legumes of all kinds as soil-builders, never recognizing the fact that they only have the ability to supply their own nitrogen and are

just as dependent on the soil for supplying the minerals as are the non-legumes.

The above has been conclusively demonstrated at Holly Springs, where for several years vetch and cotton have been grown on land liberally fertilized in the beginning with a complete mixture. This vetch came to grow so luxuriantly that in 1937 no nitrogen was added to the phosphorus and potash applied to the cotton, yet in some instances yields up to two bales per acre were obtained.

Rotations & Fertilizers for Bright Tobacco

(*From page* 10)

meeting annually to study their field results in fertilizer experiments with tobacco grown on different kinds of soil and to formulate fertilizer recommendations for this crop.

The recommendations which they have formulated and issued are based upon the best judgment of all these workers. The mixtures which they recommend it is believed are the ones which when used properly will give higher return per acre, especially when this treatment is linked up with proper selection of the soil and seed, proper cultivation, spacing of the plants in the row, and harvesting, curing, and grading the crop. It is fully realized that these better mixtures will usually cost more than an ordinary or special 3-8-3 mixture, because they will contain more plant food and 2 per cent each of chlorine and magnesia, and will be made of the best grade of materials. Where the acidity of the soil is low to fairly low, 3 per cent of chlorine may be used. About one-third of the nitrogen will be derived from high-grade organic materials and two-thirds from standard inorganic water-soluble materials, one-half of which is in the nitrate form. Wherever the recommended mixtures have been used by farmers, the returns have been found to be almost universally satisfactory.

It is remarkable that there are still some growers in the belt who will buy, year after year, low-grade fertilizers to use on their tobacco, an expensive crop to produce. Such growers, generally, are those who are content to receive low acreage returns. If they are to get the best returns for the money and effort which they put into the crop, they will have to use fertilizer mixtures which are better proportioned and compounded to fit the needs of the crop grown on their particular kind of soil.

It is a well-known fact that sandy and loamy soils of the Marlboro, Norfolk, and Craven series of the Coastal Plain section are the soils, other things being equal, that produce the best yields and quality of tobacco. These soils, and these alone, as far as practicable, should be devoted to the growth of this crop on each farm where they occur.

Fertilizer Recommendations

For tobacco grown on adapted soils, it is recommended for those which are of a heavy nature and are of the more productive character that 800 to 1,000 pounds per acre of a mixture containing 3 per cent nitrogen, 10 per cent available phosphoric acid, and 6 per cent potash be used in the drill before transplanting.

For the light and less productive soils, use 1,000 to 1,200 pounds of the same mixture per acre.

On sandy loams and fine sandy loams, underlain by sandy clay subsoils, it will not usually be necessary to use more than about 800 to 1,000 pounds per acre; but on sands and loamy sands, underlain by open sandy subsoils, it will generally be best to

use about 1,000 to 1,200 pounds per acre applied in two applications, about 600 to 700 pounds in the drill before transplanting and the remainder of the application as a side-dressing after the plants have begun to grow well and just before a cultivation.

In many cases, it will pay in improved quality of the leaf to add as a side-application 60 to 120 pounds of potash as a supplement within three weeks after transplanting and just before a cultivation.

There are few, if any other, crops grown in the South that require the care in the selection of the fertilizer mixtures and analyses that tobacco does, and on which, when properly selected and used, fertilizers will give as great returns.

Green Pastures

(*From page* 13)

of rather uniform size in a rotation, putting one field in a permanent pasture necessitates changing the rotation or increasing the number of fields on the land kept in cultivation. If the rotation containing the annual pasture can be located on land near the permanent pasture, the fencing problem, a big one in the South, will be simplified. On a great many farms which have had some livestock other than milk cows and workstock and which have been managed with as little pasture as possible, increased acreage in pasture should be used first of all to increase the amount of available feed without any change in the number of kind of livestock kept. They will be better kept and thriftier.

On many farms, particularly those of the single one-crop areas, such as the Cotton Belt, the establishment of pastures will make it possible to keep a cow or two for milk and to cut down considerably on the feed purchased for the workstock. Providing pasture for the workstock on idle days and at night will greatly reduce the requirement for grain as well as hay. It is well not to increase the livestock kept until the pastures have been established. It is a good plan to start gradually and allow considerable margin in order to provide plenty of grazing and winter feed. As a rule, from 3 to 8 acres will be required to graze and produce winter feed for a cow and calf or equivalent in other farm animals, depending of course upon the location. In the case of farms with several tenants operating on a small scale, one or more large pastures on which their cows or herd furnishing all with milk and meat may graze is likely to be much more satisfactory and economical than having a separate pasture for each cow. Providing similarly for the mules or workstock should cut the annual cash outlay for feed fully one-third where all feed previously had been purchased.

On livestock farms where most of the land has been in harvested crops which have been used for fattening stock bought for fattening, the increased acreage of pasture should result in the keeping of more breeding stock or the purchase of stockers or feeders at an earlier age, which will necessitate feeding them longer and permit the use of more pasture and roughages in the process.

If a breeding herd is established it is important that the animals be well-bred, so that the calves may be sold as feeders or be successfully fattened at an early age and sold either as heavy veal or fat calves when weaned or a few months later. Creep feeding may be practiced on good pastures where a single location for shade, water, or

both makes it certain that the calves will make use of the creep freely. Otherwise, if extra feeding is desired it is usually better to separate the calves and allow them to nurse twice daily.

In order to get the most from permanent pastures with hogs and sheep at least two pastures should be available so that they can be changed from one to another as desired. Annual pastures meet the need for clean pastures for hogs and sheep and should be provided to supplement permanent pastures.

Pasture Efficiency

There are a number of reasons for the remarkable efficiency of pasture in livestock production. One is that its cost of production is relatively low. Its natural enemies seem to be fewer than those of most cultivated crops. Another reason for its efficiency is that it is harvested by the animals themselves. A third is its high nutritive value. The dry matter of grasses before they are mature has properties very similar to high-protein concentrates. Analyses of a large number of grasses we have made at intervals of 2 to 6 weeks from May until September showed a crude protein content for the dry matter of about 17½ per cent on the average. This is nearly double that of ear corn and slightly higher than that of wheat bran or middlings. The crude fiber content (25.6 per cent) is higher than in most concentrates, but digestion experiments which have been made show that the fiber of immature grass is as digestible as its other nutrients and as the nutrients of concentrates in general. It is only after the toughening of grass begins (a process known as lignification), which happens about the flowering stage, that the crude fiber of pasturage becomes difficult to digest and hinders the digestion of the other nutrients.

Not only is grass high in feeding efficiency, but it yields a high-quality product. Repeated experiments at the Mississippi, Purdue, and other experiment stations showed that lambs produced on good pasture alone are equal in quality to those grown on grass with a liberal supplement of grain feed, and that the cost of production was considerably less. Another remarkable property of fresh pasture is its high mineral content, which renders it especially valuable for growing animals and for females giving milk. The dry matter of immature grass contains practically four times as much mineral as the average cereal grain and as much as the average legume hay.

Harvested feeds cannot, of course, be eliminated from the livestock ration, but there are many indications that our livestock operations in the future will depend more and more upon pasture and other forage crops. We repeat again as we have for many years that animals should be and are in a few instances being bred for their capacity to produce efficiently with a minimum of concentrated feeds: pasture rotation systems and means of supplementing permanent or annual pasture with temporary pastures and hay crops will come into more common use. The efficiency of winter grazing crops in the South for maintaining beef cattle has been demonstrated experimentally by a number of the state experiment stations. From the evidence thus far obtained we feel safe in saying that as time goes on annual pastures for fall and winter use will become more general for young and growing animals, those producing milk and for those doing work, as well as for fattening animals.

Increased use of pasture not only results in a more economic system of production but pastures increase health and thrift. Rotation on clean pastures means fewer parasites and lower mortality. This applies not only to swine but to all classes of livestock in all sections of the country. Land in crops erodes much more rapidly

than land seeded to pasture. Land in corn erodes in 1 year as much as the same land in a well-sodded pasture would erode in 500 years. For all practical purposes, a good sod is permanent if the fertility is maintained

able, is about half as rich in protein, or less, and the digestibility is greatly reduced.

4. Fertilize pastures at least enough to replace the elements lost each year by grazing. Animals on good pasture

Ewes and lambs grazing in a field of permanent pasture.

by replacing those elements carried away in the carcasses of the livestock and if it is not improperly grazed, due in part, no doubt, to a rather general notion that pasture land will pretty well take care of itself. There is a surprising number of different ways to manage livestock on pasture, both permanent and annual pasture, as well as cut-over land ranges. Such pastures can stand greater abuses and yet yield fair returns.

The following points, if generally observed, will repay the stockman:

1. Give the grass a chance to get a good start in the early spring before the stock are turned on. Without top growth, the grass cannot grow strong roots.

2. Do not overgraze. Overgrazing leaves unpalatable plants to crowd out the palatable ones. Overgrazing aids erosion.

3. Do not undergraze. Pasturage allowed to mature becomes less palat-

graze only about one-third of the time, and therefore but about one-third of the manure produced is put back where it came from. Accordingly it is generally estimated that if about one-third of the plants in a pasture are legumes the nitrogen content of the soil will be maintained automatically. If the pasture is producing 100 pounds of beef per acre annually it will be necessary to apply once every 5 to 10 years 275 pounds of super-phosphate and 250 pounds of muriate of potash. At current prices this fertilizing would necessitate a cash outlay of something like $1.50 an acre, in addition to the labor cost of hauling and applying. When also necessary to purchase nitrogen the cost would be increased by about $2.40.

5. Supply elements which may be naturally deficient in the soil, for the purpose of maintaining balanced animal nutrition. In certain regions the soil is deficient in such essential min-

erals as calcium, phosphorus, and possibly iron and copper.

6. Provide fresh clean water, shade, and salt in all pastures. Satisfactory performance by livestock cannot be secured without these accessories, which are generally inexpensive but too often neglected.

7. Avoid bloating by turning cattle or sheep in when they are full of feed and when the grass is dry, and by keeping them there day and night thereafter. They should have access to good hay or straw, a continuous supply of water, and a good mineral mixture.

8. Eradicate poisonous weeds in some areas. They are most apt to be dangerous when other feed is scarce.

9. Kill weeds by close clipping at the beginning of the blooming period.

10. Kill brush by grubbing late in the summer while the sap is still up and before food is stored in the roots to provide for growth the following spring.

11. Supplement or rest pastures during periods of drought and other times of little or no growth. Where it is not practicable to turn livestock on other permanent pastures reserved or temporary pastures grown for such occasions, use such supplements as hay, silage, or soiling crops.

12. Consult your county agricultural agent or your state agricultural experiment station in order to ascertain methods best adapted to your locality and what portions of your farm you could most profitably devote to either annual or perennial pasture crops.

What's Wrong With Your Alfalfa Crop?

(*From page* 22)

is a common mistake. Superphosphate, possibly up to a ton with manure, seems a good investment. But the unpardonable sin committed against this valuable crop, restricting its greater usefulness, is to starve it—possibly for potash if not well-supplied by the soil—and further to emaciate it through greed of over-cutting and at the wrong periods.

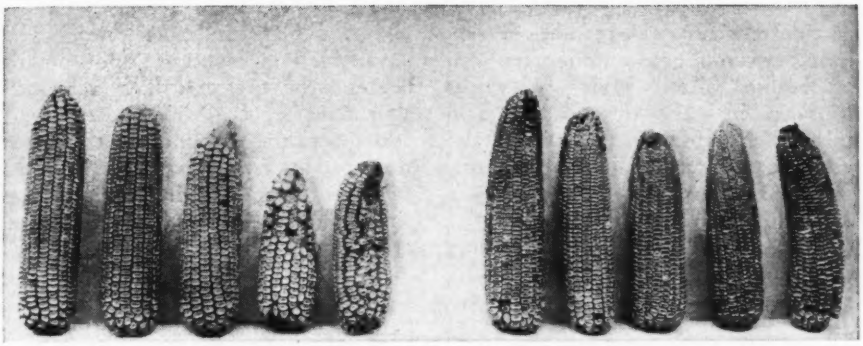
An example of how alfalfa may be grown in Massachusetts was observed at the farm of the Welch Brothers, Worcester County, in June. Three excellent fields had been well-limed, with heavy manure and generous superphosphate added prior to seeding. They have been top-dressed liberally each year with potash, superphosphate, and lime, cut twice, and lightly grazed. The solid alfalfa, slightly lodged, measured by rule 4 feet 10 inches high, *and the stand was* 8 *years old.*

Rapid Chemical Tests Show Soil Needs

(*From page* 8)

with the experiment station agronomists of the district, to eliminate small differences in analyses and to keep the number of different analyses to the minimum necessary to satisfy the requirements of the various crops grown under the many different soil and climatic conditions found in Indiana.

Suggestions for limestone applications similar to those already discussed for fertilizers are given in Table 2. Since the recommendations for any one crop are based entirely on pH values, they apply only to average soil conditions. Soils of different types may have different lime requirements and



The corn on the left was fertilized with nitrogen and phosphorus but received no potash, that on the right received nitrogen and potash but no phosphorus.

respond differently to applications of limestone. Soils high in organic matter need lime less than do light colored soils of the same pH and clay soils, less than sandy soils. However, the amount of limestone required to correct the acidity of light colored, sandy soils is less than that required for darker colored or clay soils of the same pH.

As a supplement to the suggested lime recommendations a printed sheet indicating the relative acidity tolerance of a number of crops has been prepared. This information is shown in Table 3. The pH values which characterize each group are looked upon as the minimum values that can be depended on as satisfactory for all soil and climatic conditions. Under

TABLE 2. SUGGESTED LIME APPLICATIONS PER ACRE FOR SOILS OF DIFFERENT pH TESTS

Rotation of crops with legumes is essential to good yields, and the rate of liming depends largely on the legume crops to be used. Soils that test acid on the surface, but have sweet subsoil within 2 feet, require less lime than those with deeper acid subsoils. Drilling 300 to 500 pounds of ground limestone with the legume seed is often successful on soils where 1 to 2-ton broadcast applications are indicated. Soils that are dark colored, or that have been heavily manured, or which test high in phosphorus and potash, need less lime than soils of similar pH testing low in plant foods. Phosphate is more efficient in the soil at pH 6.2 to pH 6.8 than at lower or higher pH.

	Systems with Different Crops in Rotation								
Soil pH Tests	Alfalfa or Sweet Clover Tons	Red Clover Tons	Timothy Tons	Soy-beans Tons	Lespedeza or Red Top Tons	Corn and Oats Tons	Potatoes and onions on muck Tons	Garden Crops Tons	Lawns Tons
3.8—4.2	8	6	5	4	3	4	8	6	4
4.2—4.6	6	5	4	3	2	3	4	5	3
4.6—5.0	5	4	3	2	1	2	0	4	2
5.0—5.4	4	3	2	1	0	1	0	3	1
5.4—5.8	3	2	1	0	0	0	0	2	0
5.8—6.2	2	1	0	0	0	0	0	1	0
6.2—6.4	1	0	0	0	0	0	0	500lb Sulfur	0	0
6.4—7.0	0	0	0	0	0	0	0	1,000lb Sulfur	0	0
7.0—7.4	0	0	0	0	0	0	0	2,000lb Sulfur	1,000lb 0 Sulfur	1,000lb 0 Sulfur

Sulphur makes soil more acid and neutralizes excess lime which is undesirable in some cases. Eight hundred pounds of sulphur will neutralize one ton of limestone.

particularly favorable conditions satisfactory crop production often can be obtained on soils having pH values considerably below those indicated in this table. Abundant supplies of organic matter and available plant nutrients are particularly effective in producing such conditions.

Considerable information regarding the reaction (pH) and "available" phosphorus and potash supplies in Indiana soils and also regarding the influence of fertilizer applications on these factors has been obtained

TABLE 3. RELATIVE TOLERANCE OF LEGUMES AND OTHER CROPS TO SOIL ACIDITY

No exact pH can be given for any crop. Some crops will grow on acid soils and yet respond to lime. Acid-tolerant crops like lespedeza may do better on limed land, but not compete with rank-growing, lime-loving crops on sweet soil. The supply of plant food and organic matter in the soil has a marked influence on the need for lime.

Greatest Tolerance	Legumes	Field Crops	Truck Crops	Weeds
pH 4.0 to 4.8 and above Very strongly acid	Japanese Lespedeza Korean Lespedeza Sericea Hop clover	Red Top Buckwheat Rye	Huckleberries Dewberries Blackberries Strawberries	Dewberries Broom sedge Red sorrel Wild garlic Cinquefoil
pH 4.3 to 5.4 and above Strongly acid	Vetches Soybeans Yellow trefoil Cow peas	Millett Oats Sudan grass Sorghum Tobacco Broom corn	Black raspberries Potatoes (Irish) Potatoes (Sweet) Onions on muck Watermelons Tomatoes	Bracted plantain Ox-eye Daisy Chicory White Top Curled dock Wild carrot
pH 5.4 to 6.0 and above Medium acid	Crimson clover White clover Alsike clover Beans	Corn Wheat Timothy Canada blue grass Kentucky blue grass	Red raspberries Sweet corn Beans Radishes Turnips	Buckhorn Winter cress Crab grass Canada thistle Quack grass Wild mustard
pH 6.0 to 6.6 and above Slightly acid	Red clover Mammoth clover Canada field peas	Barley Rape Mint Sugar beets	Onions on loam Carrots Cantaloupes Beets, peas Lettuce	Common plantain Smart weed Artichoke Jimson weed Dandelion
pH 6.6 to 8.2 Neutral to alkaline	Alfalfa Sweet clover		Spinach Cabbage Cauliflower Celery	

through the use of rapid chemical tests in the Soils Laboratory. This applies both to general farming and to the permanent fertility experimental plats operated by the Agronomy Department at various locations throughout the State.

Data given in Table 4 indicate that for the permanent fertility plats there are no significant differences in "available" phosphorus and potash supplies between the untreated and fertilized plats, in most cases. The "available" phosphorus and potash contents of the soils have remained approximately the same regardless of treatment, the amounts of these elements added from year to year on the fertilized plats appearing to have been either removed in the harvested crops or fixed in the soil in a form no longer available to plants. A similar finding as a result of soil tests using the Neubauer method has been reported previously by the author (5).

While such results seemed surpris-

ing at first, a more careful analysis of the situation showed that these results were to be expected in view of the small amounts of fertilizers used on these permanent fertility plats. Calculations of the probable removals of plant nutrients by the crops show that in many cases the increased yields due to fertilizer additions account for the removal of larger quantities of phosphorus and potash than have been added in the fertilizers used. Under

TABLE 4. SUMMARY OF TEST VALUES FOR PLANTS OF PERMANENT FERTILITY EXPERIMENTS IN INDIANA

Location	Soil	Phosphorus				Potassium			
		O* Plats	M* Plats	P* Plats	M+ P* Plats	O* Plats	M* Plats	K* Plats	(M) +P* Plats
Bedford [1]	Bedford	L—	L—	L—	L—	M+	H—	H—	H—
Bedford [2]	Bedford	VL	VL	L—	L—	M—	M	M+	..
Culver [1]	Plainfield	M+	M+	H—	H	L—	L—	L	L+
Farmland [1]	Brookston-Crosby	VL	VL	L	L	M—	M	M	..
Huntington [1]	Brookston-Crosby	L—	L—	L+	L	M—	M	M—	..
Jennings County [1]	Clermont	L—	L—	L—	L—	L	L+	L	L+
Wanatah [1]	Newton	L	L	L+	L+	L	L+	L+	M—
Lafayette [3]	Brookston-Crosby	L	L+	L+	L+	L	M+	L	M+
Lafayette [1]	Brookston-Crosby	VL	VL	L—	L	L—	L	L—	L+
Lafayette [2]	Brookston-Crosby	VL	VL	L	L	L—	L	VL	..

* O=no fertilizer or manure; P=phosphate fertilizer; M=manure; K=potash fertilizer.
[1] Fertility series. [2] Phosphate series. [3] Grain vs. Livestock series.

such conditions it should not be expected that higher test values will be obtained for the fertilized plats.

Data summarizing the results for nearly 5,000 soil samples tested in the Soils Laboratory for farmers during the past several years are given in Table 5. These samples represent all sections of the State. Because of the large number of samples involved it is believed that the results portray, quite accurately, the conditions existing in the State as a whole.

The data given in Table 5 indicate that slightly more than 69 per cent of all soils tested are definitely deficient in "available" phosphorus and that slightly more than 68 per cent are definitely deficient in "available" potash. For reaction (pH), the data show that the greater proportion of Indiana soils are either strongly to moderately acid (pH 5.9 or below) or slightly acid (pH 6.0 to 6.9), with only a relatively small number of soils found in the neutral to slightly alkaline group (pH 7.0 or above). Since experience has shown that soils in the strongly to moderately acid group are too acid for the most profitable crop production in most systems of farming, it will be seen that the data indicate a definite need for liming for almost one-half of the soils tested. An appreciable proportion of the soils in the slightly acid group require additional lime for the most satisfactory production of alfalfa and sweet clover. Thus it may be estimated that in the neighborhood of three-fourths of all

TABLE 5. SUMMARY OF RESULTS OF RAPID CHEMICAL SOIL TESTS MADE DURING 1934, 1935, 1936 AND 1937

Soil Test	Phosphorus		Potassium		Reaction (pH)		Interpretation
	Number	% of total	Number	% of total	Number	% of total	
Low	3,264	69.2	3,215	68.3	2,120[1]	45.0[1]	Deficient for all crops
Medium	620	13.2	579	12.2	2,015[2]	42.7[2]	Doubtful
High	828	17.6	918	19.5	577[3]	12.3[3]	Not deficient for most crops
Total	4,712	100	4,712	100	4,712	100	

Mucks, peats and lawn and garden soils not included.
[1] pH 5.9 or below—strongly to moderately acid.
[2] pH 6.0 to 6.9—slightly acid.
[3] pH 7.0 or above—slightly alkaline (calcareous).

Indiana soils are more or less in need of liming.

The extensive use of rapid chemical soil tests in Indiana is exerting a significant and important influence on lime and fertilizer recommendations and use. Chief among such influences are the tendencies toward the recommendation and use of larger applications of limestone, the recommendation of some fertilizer for a larger proportion of all soils and crops, and the use of a higher proportion of potash to phosphorus, particularly for corn and legumes. Thus the analysis most commonly recommended for corn and alfalfa at the present time is 0-12-12 or 0-20-20 instead of 0-14-7, and in many instances 3-12-12 is replacing the 2-12-6 formerly recommended for tomatoes. Reference to Table 1, will show that these are the analyses suggested for corn, alfalfa, and tomatoes on soils testing low or very low in both phosphorus and potassium, the condition most often found when Indiana soils are tested. In actual practice it is being found that the use of the analyses suggested in this table is simplifying the problem of fertilizer recommendations, tending to reduce the number of analyses used in the State and contributing to better fertilizer practices.

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Is Individualism Out?

(*From page 5*)

of better raw material delivered to the intakes by a universal plan of premium payments for uniform quality, certain "missionaries" went rampant and mobbed the legislature. The results were new laws which have not brought anticipated results. Meanwhile, without recourse to laws or ballyhoo, California citrus growers got busy and put orange juice into almost every milk bottle in that same old commonwealth of dairy hysteria!

At another time, in trying to wiggle out of a way to stir up individual action for improvement in production and home marketing, a movement in dairyland called for a special commission to investigate on cooperative methods in New Zealand, hoping to have these astute men bring back a cure-all for domestic discord. Finally their commission returned and presented their bills and a few bulletins. The home dairymen merely found out that the New Zealand farmers had their backs to the economic wall and were all of one racial stock, so they *had* to cooperate and regulate; where-

as in the good old home State we had 13 or more breeds of farmers and so many violently competitive milk depots that strict regulation for quality was defeated. There is no magic in imported ideas!

And when it comes to the national farm forum in congress, it is often hard to tell which lobby is for farmers and which is for framers. The funny side of it is that we plead for a national objective and a country-wide viewpoint in agriculture, and then elect Congressmen on purely local prejudice planks. No wonder the busy-body lobbies enjoy a field day at the expense of the individuals supposed to be represented there!

However, let's be positive—let's turn to the brighter side, let's sound the plea for strong and purposeful individuality once more in farming! Just as thinking starts with the individual brain, so does all progress reflect the meeting of individual needs. There is little we have in farm life which hasn't happened to us because somebody did some good, hard, old-fashioned thinking about the needs of his own neighborhood.

MY OWN conception of true liberalism is liberalism of the mind to grasp essential needs and to inspire the folks with talent and power to supply them, if we lack that particular ability ourselves. Nursing ancient grudges and fomenting bitter prejudices is far from liberalism, and it surely is not liberty, but license.

In these days it is so easy to copy what some other branch of industrial society does rather than to exercise agricultural ingenuity to devise a better way to make farming fit a changed order. My hunch is that agriculture was here first and ought to have independence enough to give full play to individualism which invents rather than imitates. We may have to drift along awhile the easy way, but let's not bog down!

Now if we hastily scan a survey of agricultural achievement we find the full effects of strong individualism in four classes of effort; and we also find that cooperative and group action has been based on trails broken by individualism.

I mean by this that individual initiative and personal achievement have been triumphant in all cases, whether through movements financed privately, by those financed with public funds, or those financed and supported by agricultural cooperatives.

RUN through this small roster of renown with me and see if individualism privately financed has not turned some deep furrows for agriculture.

In the cradle of farm progress abroad several names appear, such as Sir John Lawes, noted soil experimenter; Jethro Tull, who studied "horse-hoeing husbandry"; and those early beef cattle breeders, Cobban, Bates, and Cruickshank. We must not forget Louis Pasteur, noted French scientist. Over on this side we find Benjamin Franklin, fertilizer tester; Eli Whitney, inventor of the cotton gin; Jethro Wood of the first iron plow; and later the western immigrant, John Deere of Illinois, and his first steel plow. Down in Virginia in a shack among the meadows, Cyrus H. McCormick fought out alone the great problem of the reaper. A German settler named Wendelein Grimm developed the hardiest variety of alfalfa for the northwest prairies. David Fife of Ontario patiently worked with increase plots of wheat until he developed the strain which bears his name.

Similarly, in the Midwest we had James Reid and J. S. Leaming, each independently trying to breed a higher yielding and more uniform corn. Up in southern Wisconsin a hard-working farm boy dreamed of releasing men from stooping to tie grain into bun-

dles, and the result after years of study was the modern knotter bill and hook, invented by John Appleby. Peter Henderson of New York was another dreamer who left the horticultural world in his debt.

F. Lothrop Ames of Massachusetts forgot his wealth in a lifelong search for finer-bred Guernsey cattle. David Lubin wasn't afraid of individualism, and he brought forth the international institute of agriculture which became established at Rome. Luther Burbank bowed to no man in the plant "realm," and his discoveries netted the fruit and flower world many fortunes. Boyce Thompson's wonder laboratory of vegetative study opens new vistas.

Look next into individualism which sharpened its wits under the wings of public institutions. Here the list is so formidable and exhaustive that several books the size of ours would hardly make a beginning. I refer you for instance to the two superb volumes on superior plant and animal germ plasm, compiled by the U. S. Department of Agriculture. The roll of distinguished and disinterested contributors to agricultural progress found in our State experiment stations is the Legion of Honor of America.

LIKEWISE with the 4-H and Future Farmer juvenile movements and the extension service, we find in a moment that somebody working somewhere in an individual way laid those firm foundations. And the carrying out and the expansion of these splendid forward movements again reflect the same unbeatable combination of inspiration and individualism.

What good would it do to appropriate public money to advance the welfare of agriculture and deposit it in a corner-stone at dedication time? In other words, we do not invest public money unless we first rely upon private brains! Private brains, of course with a social leaning!

Then once more we mention government service in drafting laws and regulations deemed best suited to the times and needs of individual farmers as a whole. Here again the bulk of the tough spade work is left to the leaders, and such men as Henry Wallace, M. L. Wilson, and Marvin Jones —and numerous silent workers—devote the best that is in them for the cause.

FINALLY, turning to the great cooperative ranks, of which our agrarian States are honestly proud, it is personal valor and long working hours, plus ingenious thinking, which supply the mainspring of their success. They simply won't run themselves. G. Harold Powell, Charles Teague, Samuel Sanders, and Judges Bingham of Kentucky and Miller of New York are outstanding examples of that sterling devotion to individualism which makes cooperatives lasting. And this is a kind of individualism that works well in harness, and which knows that team work and grand-stand play are two different things!

I think that agriculture will not relinquish its slow but sure advance to newer social goals or be sidetracked by glittering generalities. Its assets are just the same as ever supported and exhalted by superb individualism. It represents the last of the complete crafts, where each man must know and be prepared to do all there is to do. It communes with natural forces and rises with new courage after a season's brief defeat. It possesses an army of well-trained and ambitious youth, mostly headed wholesomely in the right direction. It depends on friendly human relationships in pleasure and in trade, and the warp and woof of its cooperative power lies, as always, in the will and the welfare of the individual farmer.

When we have lost our rural individualism, and not until then, may we say there is no hope in green pastures!

GENEROUS!

"Look what the Lawd's done fo' you all, bredren!" shouted the parson. "Give Him a tenth. A tenth belongs to de Lawd!"

"Amen!" yelled a perspiring member of the congregation, overcome by emotion. "Glory to de Lawd, give Him mo'—give Him a twentieth!"

Dad: "I'll teach you to make love to my daughter, young man."

Suitor: "I wish you would. I don't seem to be doing so well."

He: "I suppose you dance."

She: "Oh yes, I love to."

He: "Great. That's better'n dancing."

FOR EXAMPLE

Two colored men were discussing things in general. One was telling how he'd just got a job as a Pullman porter and that his conductor had told him he must treat the passengers with tact.

"What am dis here tact stuff?" he asked.

"Let me enlighten yore intelleck, brothah," said the other and wiser darkie. "Once ah was workin' up at de Waldawf hotel. One day ah was cleanin' up and happens to open a bathroom door and dere was a lady sittin' in de tub.

"Ah shuts de door quick and ah says 'Beg yo' pahdon, suh!

"Well, dat 'beg yo' pahdon' was jes plain politeness, but de 'suh'—dat was *tact.*"

Edison, with all his inventions, was a piker compared to the ambitious young photographer who advertised: "Your baby, if you have one, can be enlarged, tinted, and framed for $8.79."

About the busiest thing in the world is a hen scratching for one chick. We must give the hen credit for not letting up on her energy because the chick crop was not what she expected.

NO MISTAKE

Jimmy: "What's that book?"

Elsie: "It's entitled 'What Twenty Million Women Want'."

Jimmy: "Yeah? Let's see if they spelled my name right."

An intelligent girl is one who knows how to refuse a kiss without being deprived of it.

When the conductor came around, the mother said, "One fare for me and a half fare for the boy."

The conductor looked critically at the lad and replied, "But, lady, he has on long pants."

"If that's the way you figure," she answered, "full fare for the boy and half fare for me."

MASQUERADE

The guests at a recent ball were supposed to represent insects. A meek little man who arrived in his everyday clothes and without any disguise explained falteringly that it was his wife's idea.

Potash Deficiency Symptoms

By ECKSTEIN, BRUNO *and* TURRENTINE

(A new publication—248 pages in German, French, and English—profusely illustrated with 55 plates in 4 colors and 41 striking figures in black and white.)

This work presents comprehensive information on characteristic potash deficiency symptoms appearing on the most important cultivated crops. The comments accompanying each color plate make this a very practical hand-book for identifying potash starvation as it appears on 45 different crops.

The first part of the book is devoted to the general symptoms of potash deficiency and includes chapters on: 1—External symptoms and modifications of the inner structure of the plant; 2—Secondary effects of potash deficiency; 3—Potash deficiency and the market value of crops; and 4—Pathology of potash deficiency. The second part is concerned with the potash deficiency symptoms on various cultivated crops, including: 1—Corn and other cereals; 2—Fruit trees; and 3—Vines. The colored plates illustrate potash deficiency symptoms on wheat, rye, oats, barley, rice, corn, alfalfa, red clover, crimson clover, white clover, timothy, canary-grass, horse bean, soybean, sugar beet, potato, turnip, grape vine, apple, orange, tangerine, red currant, gooseberry, strawberry, tomato, onion, carrot, spinach, celery, chillies, cucumber, white cabbage, red cabbage, Brussels sprouts, curly kale, Savoy cabbage, cauliflower, bean, pea, cotton, flax, sugar cane, coffee, tobacco, and peppermint. A colored chart shows the relative removal of N, P_2O_5, and K_2O by 56 different crops.

This book will be of particular value to all interested in the problems of plant nutrition and fertilizer usage, including teachers of vocational agriculture, county agents, research workers, and members of the fertilizer trade.

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